ORDER NO. VQS0281-4
D5

Panasonic

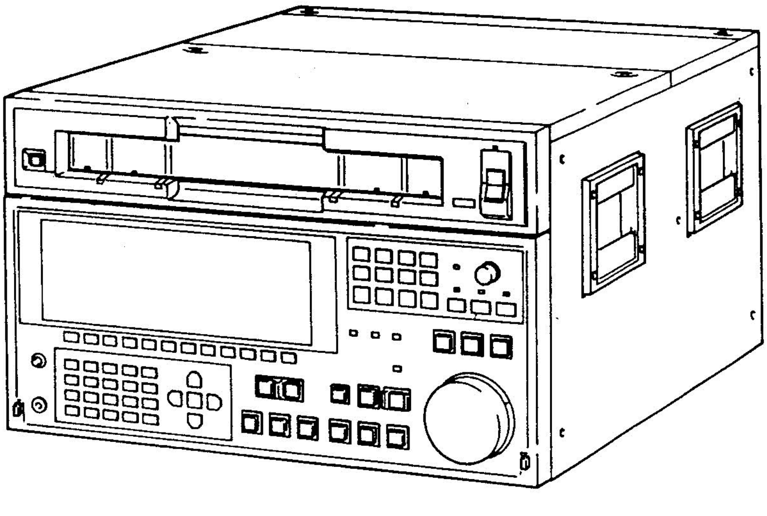
D-3 1/2" DIGITAL

STUDIO VTR

AJ-D350-P/E
NTSC/PAL

Operating Instructions & Service Manual

V. 5–0



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Broadcast Systems

FILE NO. VSD9106M001-5

⚠ WARNING
This service literature is designed for experienced repair technicians only and is not designed for use by the general public. It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product. Products powered by electricity should be serviced or repaired only by experienced professional technicians. Any attempt to service or repair the product or products dealt with in this service literature by anyone else could result in serious injury or death.

D-3 1/2" DIGITAL

STUDIO VTR
AJ-D350

INTRODUCTION

This Service Manual contains all operation and technical information for use and service of the Panasonic 1/2" Digital Studio Video Tape Recorder model AJ-D350.

This Service Manual Ver. 5-0 is available from serial number B5TMGXXXX for NTSC and PAL.

The following software has been up dated from above serial number.

Software	NTSC	PAL
FRONT	N2.12	P2.12
SYSCON	N2.17	P2.17
REMOTE	N2.12	N2.12
AV	N2.11	P2.11
TC	N2.11	P2.11
AT	N1.30	P1.30
REEL	N1.61	P1.61
CAP	N1.50	N1.50
DRUM	N0.01	N0.01

Contents of Service Manual

Operation Instruction
Section 1. Technical Descriptions
Technical Information
Supplement Service Manual
Section 2. Maintenance & Mechanical Adjustment
Section 3. Electrical Adjustment
Abbreviations and IC Information
Section 4. Modules
  (1) Block Diagrams
  (2) Schematic Diagrams
  (3) Printed Circuit Boards Diagrams
Section 5. Exploded Views & Parts List
  (1) Electrical Parts List
  (2) Exploded Views and Mechanical Parts List

Panasonic
Broadcast Systems

OPERATING INSTRUNCTION

Please attatch your Operating Instruction No. VQT5887 which has been already distributed to your service brunch.

Service Manual

Supplement
Service
Manual

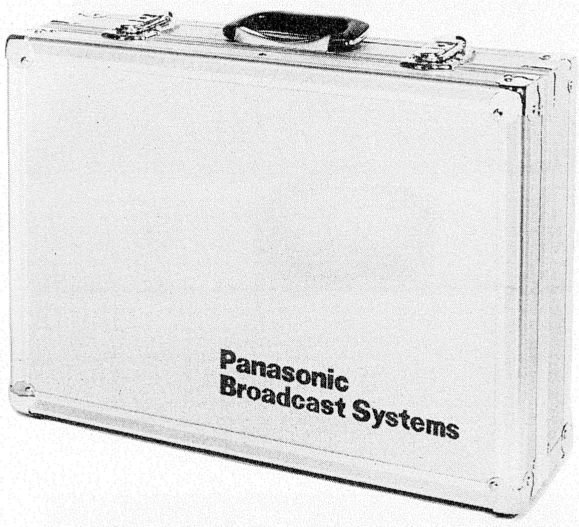
Panasonic
Broadcast Systems

Order No. VSD9503T001

Technical Information

Broadcast Product

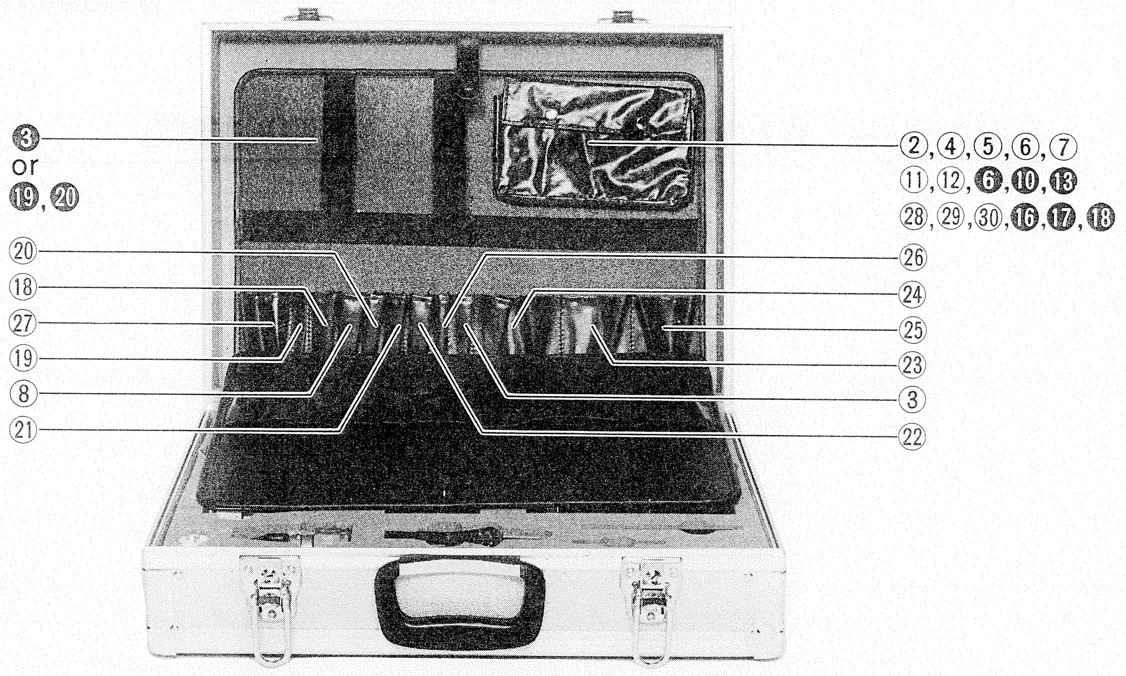
SUBJECT D3 Tool Kit (Part NO. VFK0813C)



Tool Kit and Check Light part number have been changed as follows.

Part Number					
Ref. No.	Original Part No.	New Part No.	Part Name & Descriptions	Pcs	Remarks
– –	VFK0813B	VFK0813C	Tool Kit	1	
– –	VFK0936	VFK0948	Check Light	1	

Panasonic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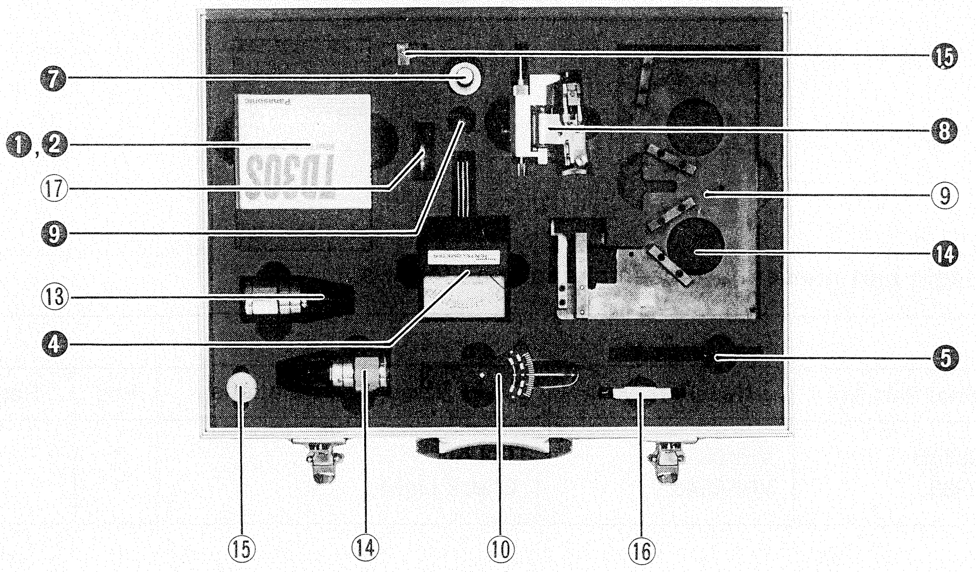
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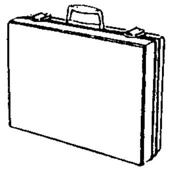
○ : STANDARD TOOLS

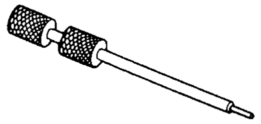
● : OPTIONAL TOOLS (Not included in Tool Case

Standard Servicing Fixture & Tools

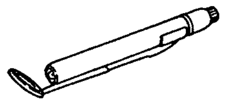
1 **VFK0812**
Tool Case



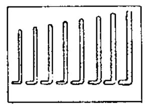
2 **VFK293**
Post Driver



3 **VFK0948 (or purchase locally)**
Check Light

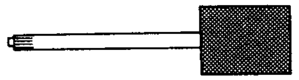


4 **VFK0326 (or purchase locally)**
Hex. Wrench Set

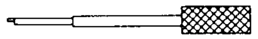


Gosho's
Hex. keys No. 505-G
1.27, 1.5, 2.0, 2.5, 3.0

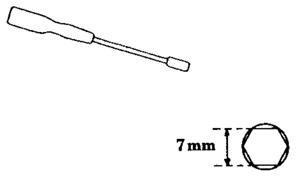
5 **VFK0446**
Fine Adjustment Screw Driver
(3mmϕ)



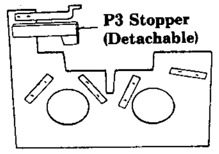
6 **VFK0357 (ϕ1.5)**
7 **VFK0358 (ϕ2)**
Eccentric Screwdriver



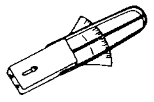
8 **VFK0676 (or purchase locally)**
Nut Driver (7mm)



9 **VFK0719**
Mech. Neutral Adjustment Plate

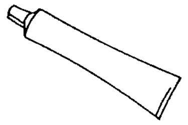


10 **VFK66**
Fan Type Tension Gauge

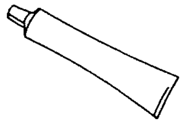


(±2000 grams max.)

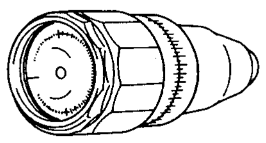
11 **MOR265**
Morlytone Grease (Black)
(for metal part)



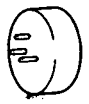
12 **VFK0749**
Froiral Grease (White)
(for plastic part)



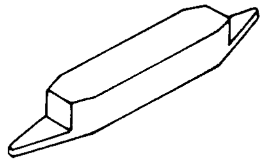
13 **VFK71 (150g max.)**
14 **VFK0133 (1200g max.)**
Dial Torque Gauge



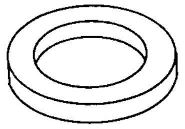
15 **VFK0134**
Dial Torque Gauge Adaptor



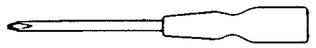
16 **VFK0363**
Post Height Fixture



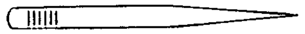
17 **VFK0772**
Reel Height Adj. Tool



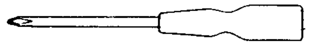
18 **VFK0337**
Philips Driver (Large)



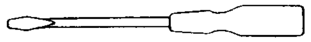
19 **VFK0369**
Tweezers



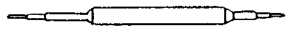
20 **VFK0366**
Philips Driver (Small)



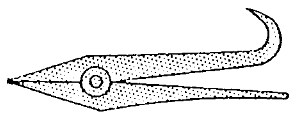
21 **VFK0367**
Screw Driver



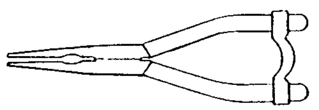
22 **VFK0368**
Core Adjustment Driver



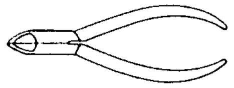
23 **VFK0335**
Retaining Remover



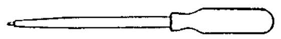
24 **VFK0371**
Radio Prier



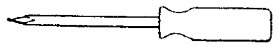
25 **VFK0372**
Cutter Prier



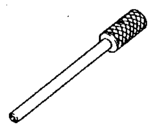
26 **VFK0338**
Trimmer Adjustment Driver



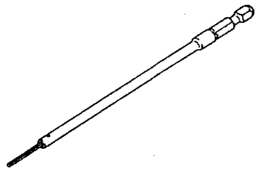
27 **VFK0818**
Screwdriver



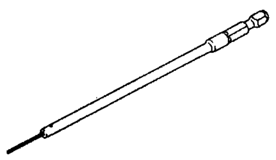
28 **VFK0910**
Post Shell Driver (1)



29 **VFK0920**
Post axis Driver (4) (2mm)



30 **VFK0912**
Post axis Driver (3) (1.5mm)

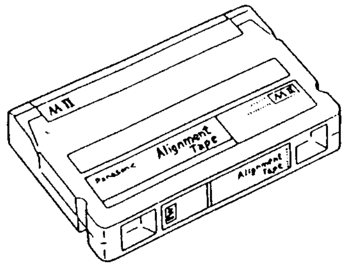


CONTENTS OF D3 TOOL KIT

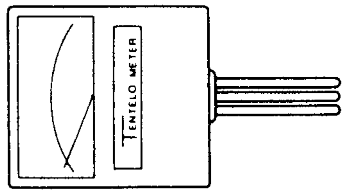
Ref. No.	Part No.	Q'ty	Tool Name	AJ-D350	AJ-D310/D320	AJ-D340
1	VFK0812	1	Tool Case			
2	VFK0293	1	Post Driver	V	V	V
3	VFK0948	1	Check Light	V	V	V
4	VFK0326	1	Hex Wrench Set	V	V	V
5	VFK0446	1	Fine Adjustment Screw Driver (3mmϕ)	V	V	V
6	VFK0357	1	Eccentric Screwdriver (ϕ1.5)	V	V	V
7	VFK0358	1	Eccentric Screwdriver (ϕ2)	V	V	V
8	VFK0676	1	Nut Driver	V	V	V
9	VFK0719	1	Mech Neutral Adjustment Plate	V		V
10	VFK66	1	Fan type Tension Gauge	V	V	V
11	MOR265	1	Morlytone Grease (Black)	V	V	V
12	VFK0749	1	Froiral Grease (White)	V	V	V
13	VFK71	1	Dial Torque Gauge (150g)	V		V
14	VFK0133	1	Dial Torque Gauge (1200g)	V	V	V
15	VFK0134	1	Dial Torque Gauge Adaptor	V	V	V
16	VFK0363	1	Post Height Fixture	V	V	V
17	VFK0772	1	Reel Height Adjustment	V		V
18	VFK0337	1	Philips Driver (Large)	V	V	V
19	VFK0369	1	Tweezers	V	V	V
20	VFK0366	1	Philips Driver (Small)	V	V	V
21	VFK0367	1	Screw Driver	V	V	V
22	VFK0368	1	Core Adjustment Driver	V	V	V
23	VFK0335	1	Retaining Remover	V	V	V
24	VFK0371	1	Radio Prier	V	V	V
25	VFK0372	1	Cutter Prier	V	V	V
26	VFK0338	1	Trimmer Adjustment Driver	V	V	V
27	VFK0818	1	Screwdriver	V	V	V
28	VFK0910	1	Post Shell Driver (1)	V		V
29	VFK0920	1	Post axis Driver (4) (2mm)	V		V
30	VFK0912	1	Post axis Driver (3) (1.5mm)	V		V

Optional Servicing Fixtures & Tools

1 **VFM6180EC (PAL)**
2 **VFM6080EC (NTSC)**
VFM6181EC (PAL)
3 **VFM6081EC (NTSC)**
VFM6186EC (PAL)
VFM6086EC (NTSC)
Alignment Tape

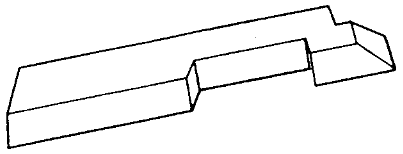


4 **VFK0132**
Back Tension Meter

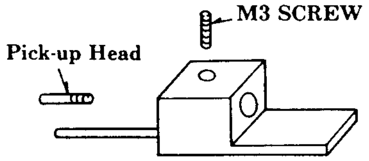


Tentelo Meter
Model: T2-H7-UM
(7 ounces, 200 grams)

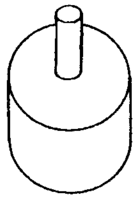
5 **VFK0722**
Inclined Post Angle Fixture



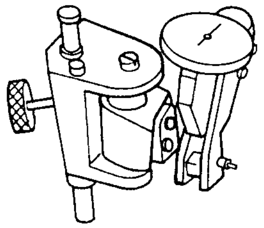
6 **VFK0742**
Micro Meter Pick-up Fixture



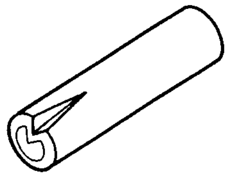
7 **VFK0771**
Calibration Block



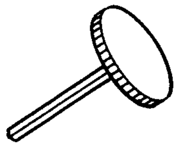
8 **VFK0737A**
Drum Replacement Tool



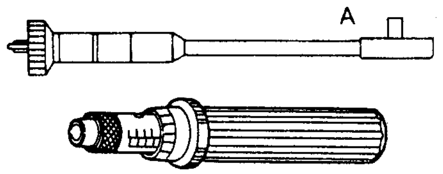
9 **VFK0779**
Position Change Driver



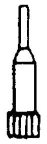
10 **VFK0811**
Hex Screw



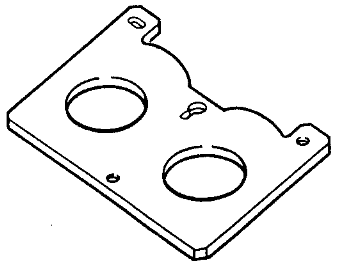
11 **VFK0740**
Torque Wrench A (6kg)
12 **VFK0878**
Torque Wrench (2kg～12kg)



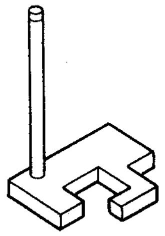
13 **VFK0741**
Adaptor
Screwdriver



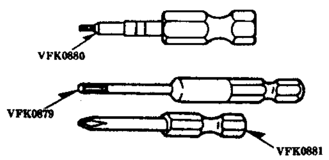
14 **VFK0761**
D310 Mech Neutral Plate



15 **VFK0760**
D310 P2 Tension Post Gain
Adjustment Tool



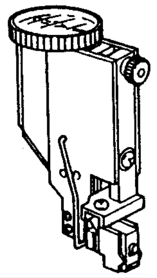
16 **VFK0880**
17 **VFK0881**
Cross Point for VFK0878
18 **VFK0879**
Hexagon Head Bit



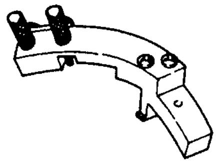
OPTIONAL TOOL (These Tools are not included in this TOOL CASE)

Ref. No.	Part No.	Q'ty	Tool Name	AJ-D350	AJ-D310/D320	AJ-D340
❶	VFM6180EC (PAL) VFM6080EC (NTSC)	1	Alignment Tape (1)	V	V	V
❷	VFM6181EC (PAL) VFM6081EC (NTSC)	1	Alignment Tape (2)	V	V	V
❸	VFM6186EC-R (PAL) VFM6086EC-R (NTSC)	1	Alignment Tape (3)	V	V	V
❹	VFK0132	1	Tension Meter	V	V	V
❺	VFK0722	1	Inclined Post Angle Fixture	V		V
❻	VFK0742	1	Micro Meter Pick-up Fixture	V		V
❼	VFK0771	1	Calibration Block	V		V
❽	VFK0737A	1	Center Drum Replacement Tool	V		V
❾	VFK0779	1	Position Change Driver	V		V
❿	VFK0811	1	Hex Screw	V		V
⓫	VFK0740	1	Torque Wrench A	V		V
⓬	VFK0878	1	Torque Wrench B	V		V
⓭	VFK0741	1	Torque Wrench A adaptor	V		V
⓮	VFK0761	1	D310 Mech Neutral Plate		V	V
⓯	VFK0760	1	D310 P2 Tension Post Gain Adjustment Tool		V	
⓰	VFK0880	1	Cross Point for VFK0878	V		V
⓱	VFK0881	1	Cross Point for VFK0878	V		V
⓲	VFK0879	1	Hexagon Head Bit		V	
⓳	VFK0865	1	Drum Replacement Tool		V	
⓴	VFK0866	1	VFK0865 Adaptor for Portable		V	

19 **VFK0865**
Drum Replacement Tool ※



20 **VFK0866**
VFK0865 Adaptor for Portable ※



※ VFK0865 and VFK0866 have included in special box. If you want to install the special box in Tool Case, please install No. 3 position instead of alignment tape.

Order No. VSD9503T002

Technical Information

Broadcast Product

SUBJECT : Digital VTR Service Fixture and Tools List Rev.1

This is to provide information about the Digital VTR Jigs and Tools for all current Digital VTR Products.

This VTR Jigs and Tools List contains all the equipments required to perform proper alignment of digital VTRs.

A circle symbol on the list means that the item is necessary for the complete maintenance and service of the listed machine.

Also the following Tools have been added.

No.	PART No.	NAME	AJ-D310,320	AJ-D340	AJ-D350	AJ-D580	TOOL KIT (VFK0813C)
46	VFK1006	Calibration Block (2) for VFK1008			△		
47	VFK1007	Calibration Block (1) for VFK1008			△		
48	VFK1008	A/C Head Tilt Measurement Tool			△		
49	VFK1031	Pick-up Head for VFK0742		AA	AA	AA	※
50	VFK1032	Connector Cable for VFK0832A	○ (S)	○ (S)	○ (S)	○ (S)	
51	VFK1037	Adaptor Cable for VFK0832A		○			

AA : Major Service Location only ○ : Available Tool S : Spare
△ : Developping ※ : Optional Servicing Fixture and Tools

Panasonic

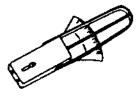
Digital VTR JIGs and TOOLs

NO	PART NO.	NAME	AJ-D310/320	AJ-D340	AJ-D350	AJ-D580	TOOL KIT (VFK0813C)
1	VFK66	Fan Type Tension Gauge	○	○	○	○	○
2	VFK71	(150g max.) Dial Torque Gauge	○	○	○	○	○
3	VFK0132	Back Tension Meter	○	○	○	○	※
4	VFK0133	(1200g max.) Dial Torque Gauge	○	○	○	○	○
5	VFK0134	Dial Torque Gauge Adaptor	○	○	○	○	○
6	VFK0293	Post Driver	○	○	○	○	○
7	VFK0326	(or purchase locally) Hex, Wrench Set	○	○	○	○	○
8	VFK0357	(φ1.5) Eccentric Screwdriver	○	○	○	○	○
9	VFK0358	(φ2) Eccentric Screwdriver	○	○	○	○	○
10	VFK0363	Post Height Fixture	○	○	○	○	○
11	VFK0446	Fine Adjustment Screw Driver (3mmφ)	○	○	○	○	○
12	VFK0676	Nut Driver (7mm)(or purchase locally)		○	○	○	○
13	VFK0719	Mech. Neutral Adjustment Plate		○	○	○	○
14	VFK0722	Inclind Post Angle Fixture		AA	AA	AA	※
15	VFK0737B	Drum Replacement Tool		○	○	○	※
16	VFK0740	Torque Wrench A		○	○	○	※
17	VFK0741	Adaptor Screwdriver		○	○	○	※
18	VFK0742	Micro Meter Pick-up Fixture		AA	AA	AA	※
19	VFK0749	Froiral Grease (White)(for plastic part)	○	○	○	○	○
20	VFK0753	10th Dubbing Simulation Tool			○		
21	VFK0760	P2 Tension Post Gain Adjustment Tool	○				※
22	VFK0761	Mech Neutral Plate	○				※
23	VFK0771	Calibration Block for GT-22		AA	AA	AA	※
24	VFK0772	Reel Height Adj. Tool		○	○	○	○
25	VFK0779	Position Change Driver		○	○	○	※
26	VFK0811	Hex Screw	○	○	○	○	※
27	VFK0832A	Linearity/Head Height Adjustment Tool	○	○	○	○	
28	VFK0854	Rec Head PB P.C.Board	○				
29	VFK0862	VFK0832 Cable for Portable	○				
30	VFK0865	Drum Replacement Tool	○				
31	VFK0866	VFK0865 Adaptor for Portable	○				
32	VFK0869	Pick up Unit for VFK0737B		○(R)	○(R)	○(R)	
33	VFK0878	Torque Wrench B	○	○	○	○	
34	VFK0879	Hexagon Head bit	○				
35	VFK0881	Cross Point Adaptor For VFK0878	○	○	○	○	
36	VFK0910	Post Shell Driver (1)		○	○	○	○
37	VFK0912	Post Axis Dirver (3) (1.5mm)		○	○	○	○
38	VFK0920	Post Axis Dirver (4) (2mm)		○	○	○	○
39	VFK0924	P3 Stopper (2)		○		○	
40	VFK0948	Check Light	○	○	○	○	○
41	VFK0954	Equalizer Adjustment Tool				○	
42	VFK0955	Post Shell Driver (2) (0.9mm)		○	○	○	
43	VFK0956	Hexagon Head Bit		○	○	○	
44	VFK0986	Elmec Equalizer Adjustment Software				○	
	VFK0987	Quatech Equalizer Adjustment Software				○	
45	VFK0989	Elmec Head Height Software	○	○	○	○	
	VFK0990	Quatech Head Height Software	○	○	○	○	
46	VFK1006	Calibration Block (2) for VFK1008			△		
47	VFK1007	Calibration Block (1) for VFK1008			△		
48	VFK1008	A/C Head Tilt Measurement Tool			△		
49	VFK1031	Pick-up Head for VFK0742		AA	AA	AA	※
50	VFK1032	Connector Cable for VFK0832A	○(S)	○(S)	○(S)	○(S)	
51	VFK1037	Adaptor Cable for VFK0832A		○			
52	VFM6080EC, VFM6081EC, VFM6086EC(NTSC) Alignment Tape		○	○	○	○	※
53	VFM6180EC, VFM6181EC. VFM6186EC (PAL) Alignment Tape					(No. 3 only)	
54	VFM5080JR, VFM5081JR(NTSC) Alignment Tape					○	
55	VFM5180JR, VFM5181JR(PAL) Alignment Tape					○	
56	MOR265	Morlytone Grease (Black)(for metal part)	○	○	○	○	○
57	TTA-20	(TESA) Micro Meter		AA(PL)	AA(PL)	AA(PL)	
58	GT-22	(TESA) Micro Meter Pick-up		AA(PL)	AA(PL)	AA(PL)	
59	-----	DAQ-12 (QUATECH)	○(PL)	○(PL)	○(PL)	○(PL)	
60	-----	Nut Driver (5.5mm)(Purchase locally)	○(PL)				

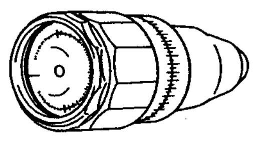
AA:Major Service Location only ×:Dis-continued ○:Available Tool ◎:Newly added by modification
△:Developping PL:Purchase Locally R:Replace S:Spare
※:Optional Servicing Fixture and Tools TOOL KIT:Also includes a small quantity of general purpose Tool & Adjusters.

Servicing Fixtures & Tools

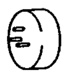
1 VFK66
Fan Type Tension Gauge



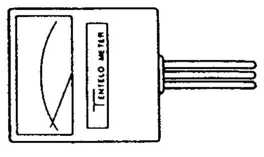
2 VFK71 (150g max.)
4 VFK0133 (1200g max.)
Dial Torque Gauge



5 VFK0134
Dial Torque Gauge Adaptor

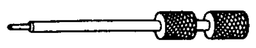


3 VFK0132
Back Tension Meter

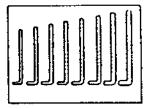


Tentelo Meter
Model: T2-H7-UM (7 ounces, 200 grams)

6 VFK0293
Post Driver

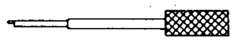


7 VFK0326 (or purchase locally)
Hex. Wrench Set

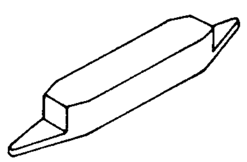


Gosho's
Hex keys No. 505-G
1.27, 1.5, 2.0, 2.5, 3.0

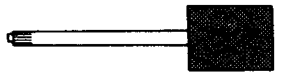
8 VFK0357 (φ1.5)
9 VFK0358 (φ2)
Eccentric Screwdriver



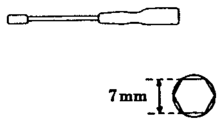
10 VFK0363
Post Height Fixture



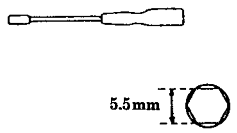
11 VFK0446
Fine Adjustment Screw Driver
(3mmφ)



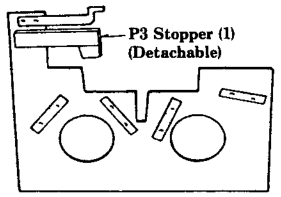
12 VFK0676 (or purchase locally)
Nut Driver (7mm)



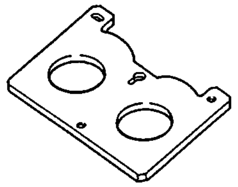
60 Nut Driver (5.5mm)
(Purchase locally)



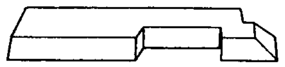
13 VFK0719
Mech. Neutral Adjustment Plate



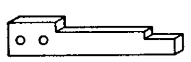
22 VFK0761
Mech Neutral Plate



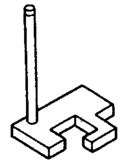
14 VFK0722
Inclind Post Angle Fixture



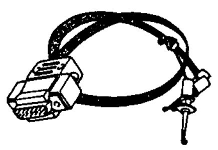
39 VFK0924
P3 Stopper (2)



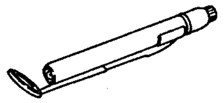
21 VFK0760
P2 Tension Post Gain
Adjustment Tool



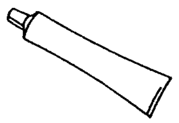
29 VFK0862
VFK0832 Cable for Portable



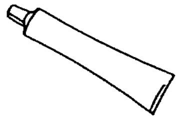
40 VFK0948
Check Light



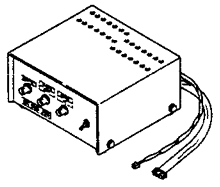
19 VFK0749
Froiral Greese (White)
(for plastic part)



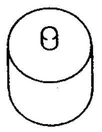
56 MOR265
Morlytone Grease (Black)
(for metal part)



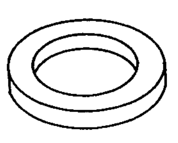
20 VFK0753
10th Dubbing Simulation Tool



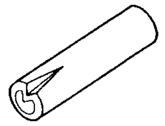
23 VFK0771
Calibration Block



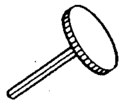
24 VFK0772
Reel Height Adj. Tool



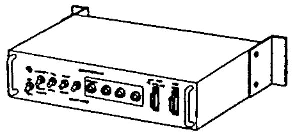
25 VFK0779
Position Change Driver



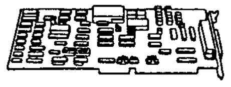
26 VFK0811
Hex Screw



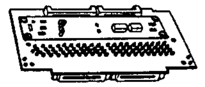
27 VFK0832A (D3/D5)
Linearity/Head Height
Adjustment Tool



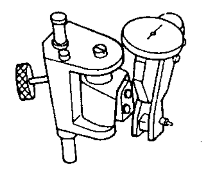
59 DAQ-12 (QUATECH)
A/D Converter Board
(Purchase Locally)



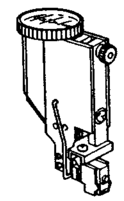
28 VFK0854
Rec Head PB P.C. Board



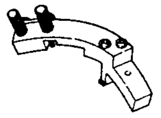
15 VFK0737B
Drum Replacement Tool



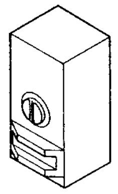
30 VFK0865
Drum Replacement Tool



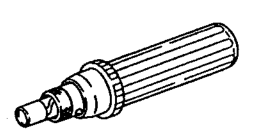
31 VFK0866
VFK0865 Adaptor for Portable



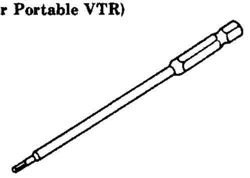
32 VFK0869
Pick up Unit for VFK0737B



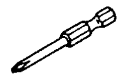
33 VFK0878
Torque Wrench B (Torque Adjustable)



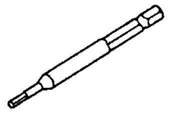
34 VFK0879
Hexagon Head Bit
(for Portable VTR)



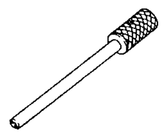
35 VFK0881
Cross Point Adaptor (for VFK0878)



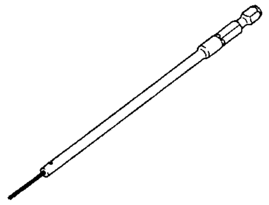
43 VFK0956
Hexagon Head Bit



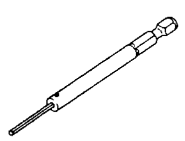
36 VFK0910
Post Shell Driver (1)



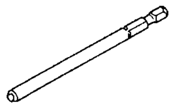
37 VFK0912
Post axis Driver (3) (1.5mm)



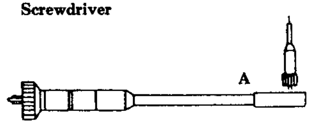
38 VFK0920
Post axis Driver (4) (2mm)



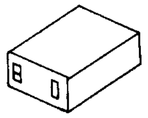
42 VFK0955
Post shell Driver (2) (0.9mm)



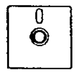
16 VFK0740
Torque Wrench A
17 VFK0741
Adaptor
Screwdriver



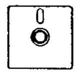
41 VFK0954
Equalizer Adjustment Tool
(Include the Software 44)



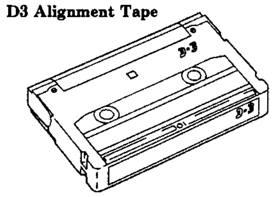
44 VFK0987 (for DAQ-12)
VFK0986 (for VFK0853)
Equalizer Adjustment Software



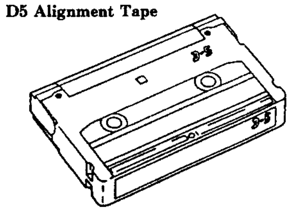
45 VFK0989 (for VFK0853)
VFK0990 (for DAQ-12)
Head Height Software



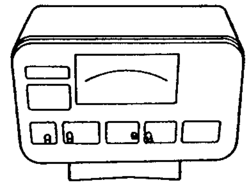
52 VFM6080EC } NTSC VFM6180EC } PAL
53 VFM6081EC VFM6181EC
VFM6086EC VFM6186EC
D3 Alignment Tape



54 VFM5080JR } NTSC VFM5180JR } PAL
55 VFM5081JR VFM5181JR
D5 Alignment Tape



57 Maker TESA TTA-20
Micro Meter
(This is not Panasonic Tool)



58 Maker TESA GT-22 (20g)
Micro Meter Pick Up
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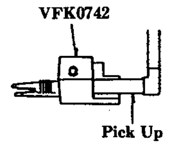
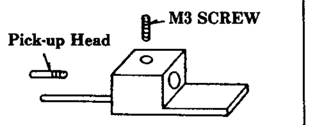
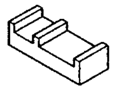


※ Purchase Locally

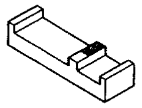
18 VFK0742
49 Micro Meter Pick-up Fixture
VFK1031
Pick-up Head



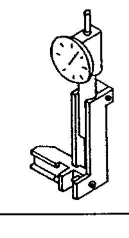
46 VFK1006
Calibration Block (2) for VFK1008



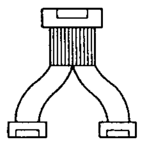
47 VFK1007
Calibration Block (1) for VFK1008



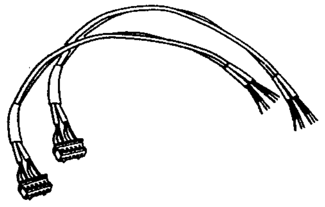
48 VFK1008
A/C Head Tilt Measurement Tool



51 VFK1037
Adaptor Cable for VFK0832A



50 VFK1032
Connector Cable for VFK0832A



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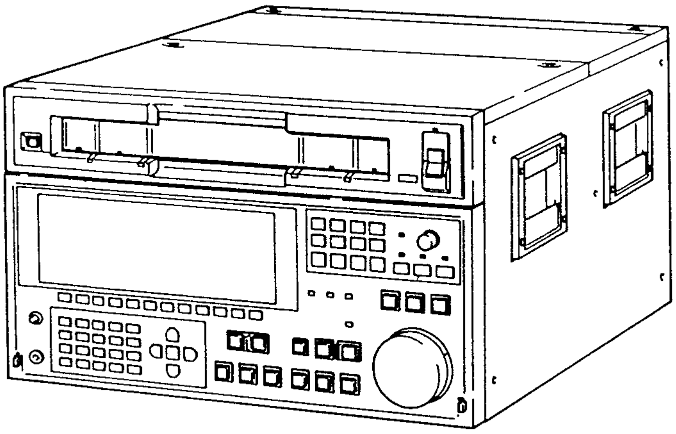
Panasonic
Broadcast Systems



AJ-D350

D-3
½" DIGITAL

(PAL/NTSC)

SUBJECT: CENTER DRUM REPLACEMENT AND ADJUSTMENT

RECOMMEND TEST AND SERVICE EQUIPMENT OF HEAD HEIGHT
AJ-D350 CHECK OF PROTRUSION
AJ-D350 CENTER DRUM REPLACEMENT PROCEDURES
D3 LINEARITY/HEIGHT ADJUSTMENT TOOL WITH SOFTWARE Ver. 6.2
AZIMUTH TOOL ADJUSTMENT
SCHEMATIC DIAGRAM AND CIRCUIT BOARD DIAGRAM

Panasonic

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CONTENTS

RECOMMENDED SERVICE EQUIPMENT OF HEAD HEIGHT 1-1
AD-J350 CHECK OF PROTRUSION 1-4
CENTER DRUM REPLACEMENT FLOW CHART 1-6
AJ-D350 CENTER DRUM REPLACEMENT PROCEDURES 1-8
TAPE PASS LINEARITY ADJUSTMENT FLOW CHART 1-13
RF ENVELOPE LINEARITY CONFIRMATION ... 1-14
UPPER DRUM ADJUSTMENT 1-15
P3 POST HEIGHT ADJUSTMENT 1-16
CONFIRMATION OF P3 POST INCLINED ANGLE 1-17
P4,P5 POST HEIGHT ADJUSTMENT 1-18
P6 POST HEIGHT ADJUSTMENT 1-19
A/C HEAD TILT CONFIRMATION 1-20
A/C HEAD TILT ADJUSTMENT 1-22
A/C HEAD HEIGHT ADJSUTMENT 1-24
A/C HEAD AZIMUTH ADJSUTMENT 1-25
CTL OUTPUT CONFIRMATION 1-26
TAPE TRANSPORTATION POSTS LIMIT POSITION TABLE 1-27
P7,P8,P10 AND P11 POST HEIGHT ADJUSTMENT 1-28
A/C HEIGHT HORIZONTAL POSITION COARSE ADJSUTMENT 1-29
PG SHIFTER ADJSTMENT 1-30
HEAD ADJSUTMENT TOOL CABLE CONNECTION WITH AJ-D350 1-31
LINEARITY / HEAD HEIGHT ADJUSTMENT TOOL WITH SOFTWARE VER. 6.2 1-32
LINEARITY / HEAD HEIGHT MENU VER.6.2 INSTRUCTIONS 1-35
LINEARITY VER.6.2 OPERATING INSTRUCTIONS 1-36
REC HEAD HEIGHT VER.6.2 OPERATING INSTRUCTIONS 1-39
FE HEAD HEIGHT VER.6.2 OPERATING INSTRUCTIONS 1-45
FLYING HEAD HEIGHT CONFIRMATION 1 1-48
RF ENVELOPE CONFIRMATION BY MODE CHANGE 1-51
INTRODUCTION OF DRUM AXIS VERTICALITY ADJSUTMENT PROCEDURE 1-53
A/C HEAD HORIZONTAL POSITION FINE ADJSTMENT 1-57
FINAL CONFIRMATION OF TRACKING OPTIMIZE 1-58
DRUM ELECTRICAL ADJSUTMENT FLOWCHART 1-59
PG SHIFTER ADJSUTMENT (S5) 1-60
ENVELOPE DETECTION ADJUSTMENT (S1,S2) 1-60
AT (S4) BOARD ADJUSTMENT 1-61
  D/A CONVERTER FULL SCALE ADJSUTMENT 1-62
  AT HEIGHT (1) ADJUSTMENT 1-63
  AT HEIGHT (2) ADJUSTMENT 1-64
  GAIN ADJUSTMENT 1-65
  STRAIN LOOP FREQUENCY RESPONSE ADJUSTMENT 1-66
  GROUP DELAY COMPENSATION ADJUSTMENT 1-67
  CONFIDENCE PB CONFIRMATION 1-68
REC/PLAY CH0 (S1) / CH1 (S2) BOARD ADJSUTMENT 1-70
EQUALIZATION ADJUSTMENT (1) 1-71
EQUALIZATION ADJSUTMENT (2) 1-72
REC CURRENT AND REC EQUALIZER ADJUSTMENT (CH0) 1-74
REC CURRENT AND REC EQUALIZER ADJUSTMENT (CH1) 1-76
RF2 ENVELOPE DETECTION ADJUSTMENT ... 1-79
TOTAL CONFIRMATION 1-80
SPECTRUM ANALIZER SETUP 1-82

AZIMUTH TOOL ADJUSTMENT 2-1
VFK0832A LINEARITY / HEIGHT ADJUSTMENT TOOL BLOCK DIAGRAM / SCHEMATIC DIAGRAM 2-5

RECOMMEND TEST AND SERVICE EQUIPMENT OF HEAD HEIGHT

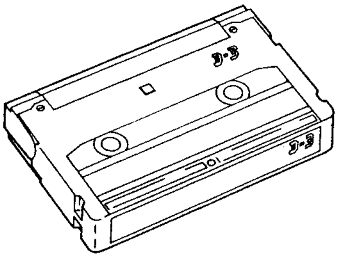
	PART No	NAME	Q'ty	PURPOSE
1	VFM6080 (NTSC) VFM6180 (PAL)	Alignment Tape (1)	1	Electrical Adj.
2	VFM6081 (NTSC) VFM6181 (PAL)	Alignment Tape (2)	1	Head Height Adj.
3	VFM6086 (NTSC) VFM6186 (PAL)	Alignment Tape (3)	1	Linearity Adj.
4	VFK0832A	D3 Linearity/Head Height Adjustment Tool	1	Linearity Adj. Head Height Adj.
5	VFK0737B	Drum Replacement Tool	1	Protrusion and Eccentric Adj.
6	VFK0779	Position Change Driver	1	Protrusion and Eccentric Adj.
7	VFK0740	Torque Wrench A	1	Upper Drum Replacement
8	VFK0878	Torque Wrench B	1	Upper Drum Replacement
9	VFK0741	Adaptor Screwdriver	1	Upper Drum Replacement
10	VFK0811	Hex Screw	1	Head Height Adj.
11	VFK0293	Post Driver	1	Linearity Adj.
12	VFK0936	Check Light	1	Linearity Adj.
13	VFK0358	Eccentric Screwdriver	1	A/C Horizontal Position Adj.
14	VFK0676	Nut Driver	1	A/C Head Height Adj.
15		Personal Computer	1	Linearity Head Height
16	DAQ-12 (QUATECH)	A/D Converter	1	Linearity Head Height
17	VFK0881	Cross Point Adaptor	1	Center Drum Replacement
18	VFK0989(for ELMEC) VFK0990(for QUATECH)	Head Height Soft	1	Linearity Adj. Head height Adj.
19	VFK1008	A/C Head Tilt Tool	1	A/C Head Tilt Adj.
20	VFK1006, VFK1007	Calibration Plate (1), (2)	1	A/C Head Tilt Tool Calibration

Recommend Test and Service Equipment of Head Height

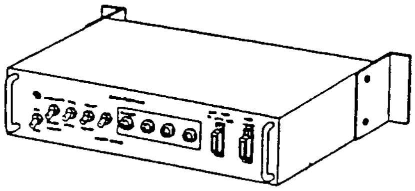
1 VFM6080EC (NTSC)
VFM6180EC (PAL) — Alignment Tape (1)

2 VFM6081EC (NTSC)
VFM6181EC (PAL) — Alignment Tape (2)

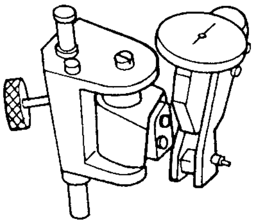
3 VFM6086EC (NTSC)
VFM6186EC (PAL) — Alignment Tape (3)



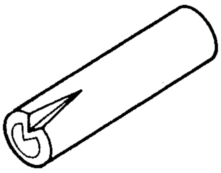
4 VFK0832A
D3 Linearity/Head Height Adjustment Tool



5 VFK0737B
Drum Replacement Tool



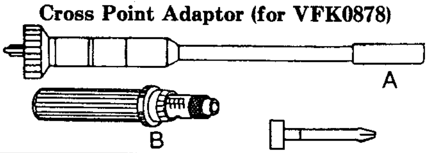
6 VFK0779
Position Change Driver



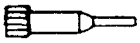
7 VFK0740
Torque Wrench A

8 VFK0878
Torque Wrench B

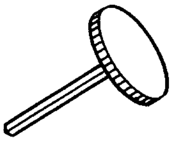
17 VFK0881
Cross Point Adaptor (for VFK0878)



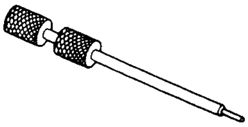
9 VFK0741
Adaptor Screwdriver



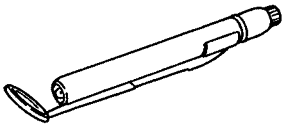
10 VFK0811
Hex Screw



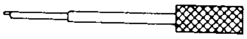
11 VFK0293
Post Driver



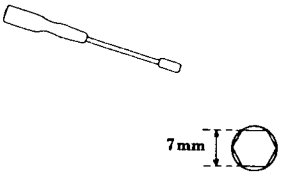
12 VFK0948 (or purchase locally)
Check Light



13 VFK0358
Eccentric Screwdriver

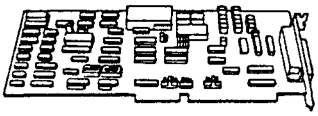


14 VFK0676
Nut Driver

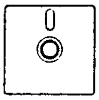


15 Personal Computer
IBM PC-AT Compatible
CPU 386/20MHz or higher
with AT BUS

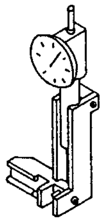
16 DAQ-12 (QUATECH)
A/D Converter



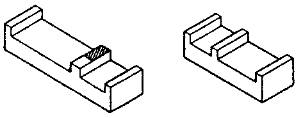
18 VFK0989 (For ELMEC)
VFK0990 (For QUATECH)
Head Height Soft



19 VFK1008
A/C Head Tilt Tool

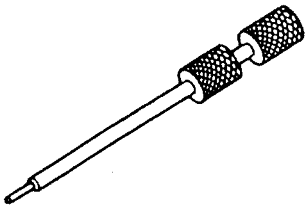
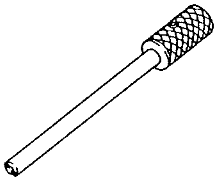
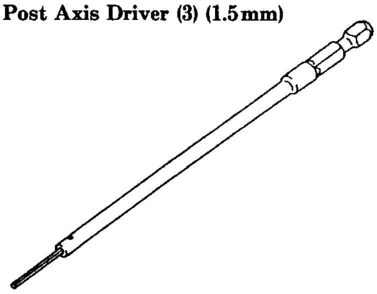
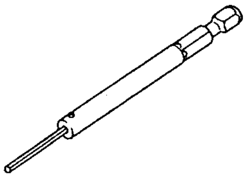
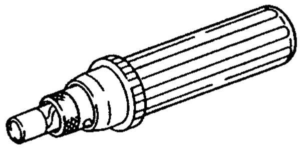
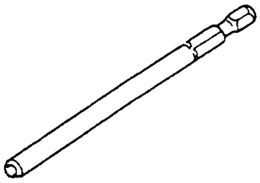


20 VFK1006
VFK1007
Calibration Plate (1), (2)



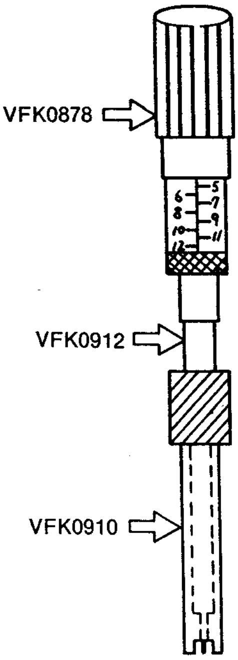
[INTRODUCTION OF NEW POST DRIVER AND VARIABLE TORQUE WRENCH]

To improve the reliability of tape pass linearity and productivity, each posts (P1 to P12) have been changed. Due to change the part, new post driver and variable torque wrench need to adjust tape pass linearity as shown below.

1 **VFK0293** **Post Driver (0.9mm)** 	2 **VFK0910** **Post Shell Driver (1)** 	3 **VFK0912** **Post Axis Driver (3) (1.5mm)** 
4 **VFK0920** **Post Axis Driver (4) (2.0mm)** 	5 **VFK0878** **Torque Wrench B** 	6 **VFK0955** **Post Shell Driver (2)** 

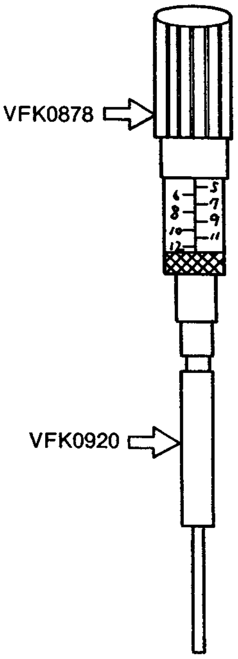
1) VFK0293 (Original Post Driver) : P2 and P3 Post Height Adjustments
2) VFK0910, VFK0912 and VFK0878: P1, P4~P12 Post Height Adjustments
3) VFK0920 and VFK0878 : A/C Horizontal Position Adjustment
4) VFK0955 : P3 Post Height Adjustment

POST HEIGHT ADJUSTMENT



※ Connect the VFK0912 to VFK0878 through the VFK0910.

A/C HORIZONTAL POSITION ADJUSTMENT



※ Connect the VFK0920 to VFK0878.

AJ-D350 CHECK OF PROTRUSION

1. Set the attachment shaft to lower position as shown in figure 1.

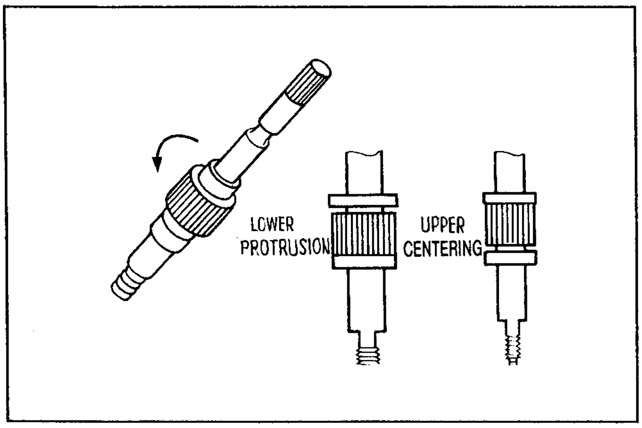

LOWER
PROTRUSION
UPPER
CENTERING

Fig. 1 attachment Shaft

2. Set the pick of center drum replacement tool to vertical position by using the pick tool as shown in figure 2 and 3.

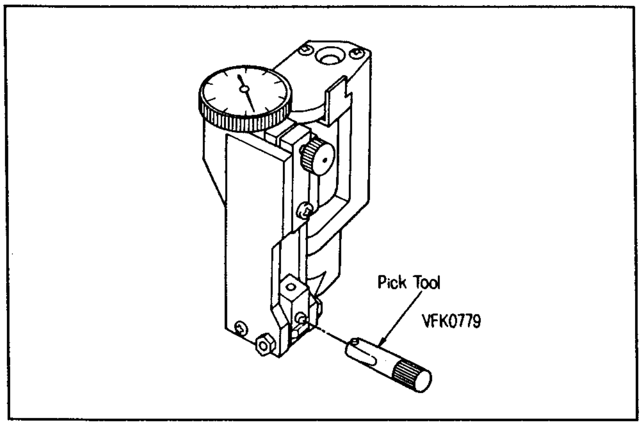
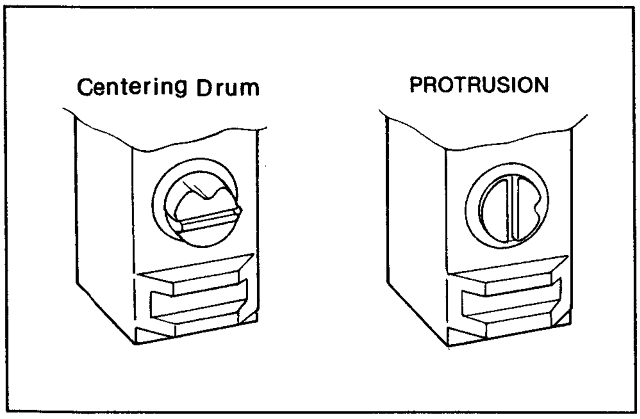

Pick Tool
VFK0779

Fig. 2 Pick Tool


Centering Drum
PROTRUSION

3. Install the attachment shaft to A position as shown in figure 4.

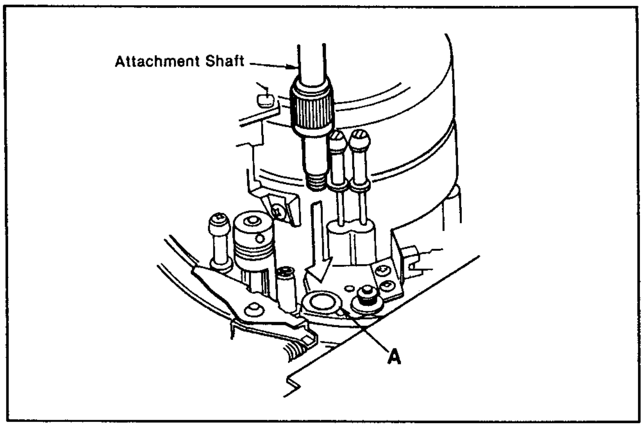

Attachment Shaft
A

Fig. 4 Attachment Shaft

4. Unscrew the 2 screws and remove the TOP cover angle on the cassette carriage.
5. Confirm that the lever of center drum replacement tool is locked and install it on the attachment shaft as shown in figure 5.
   (Do not touch the cylinder.)

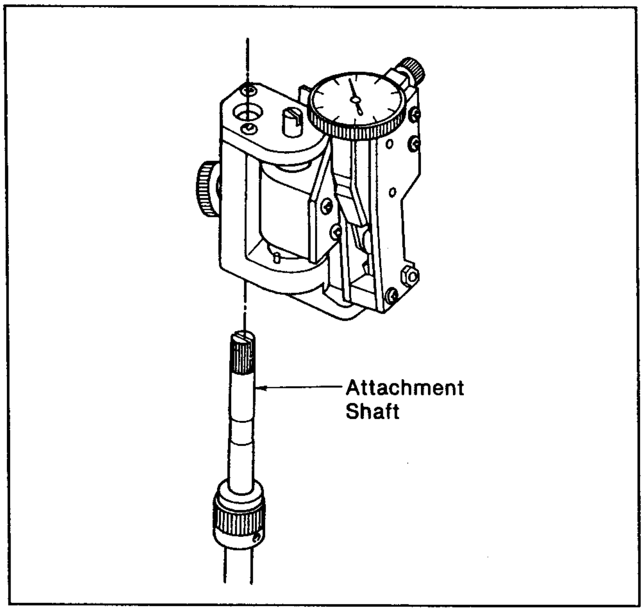

Attachment
Shaft

Fig. 5 Center Drum Replacement Tool

6. Set the attachment plate to touch the lower cylinder as shown in figure 6.
   And fix the volume (A).

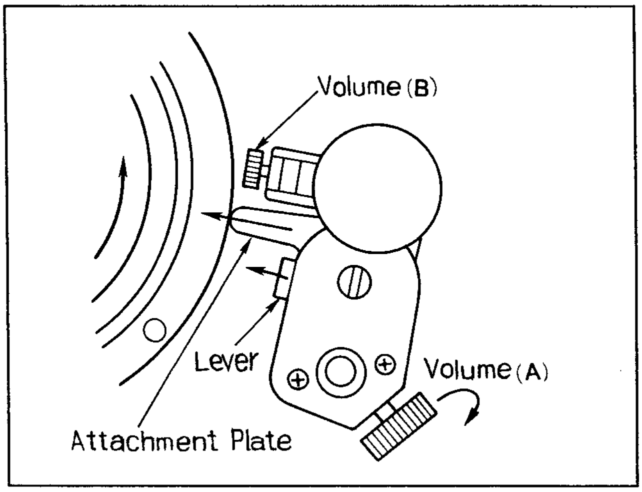
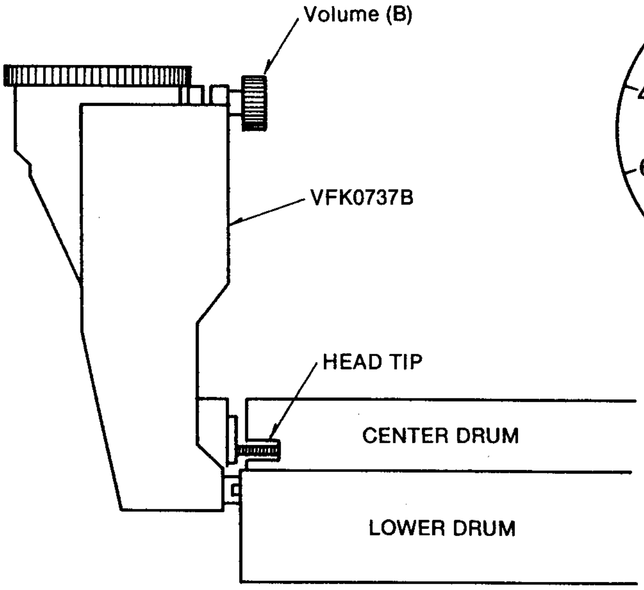
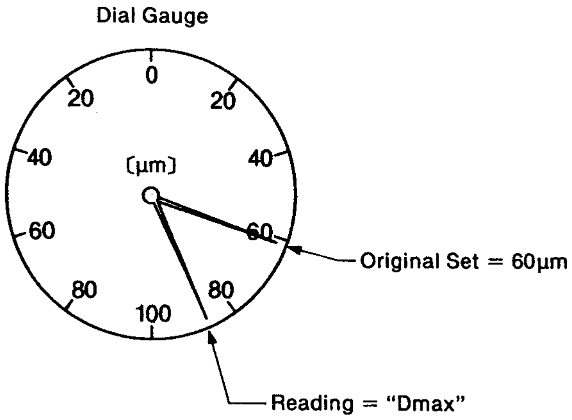

Volume (B)
Lever
Volume (A)
Attachment Plate

Fig. 6 Attachment Plate

7. Rotate the center drum so the pick will not touch the head chip when lever is released.
   Release lever and gently place pick on center drum.
8. Set the dial gauge to zero position.
   Adjust the volume (B) of the head adjustment plate so that the pick up point is touched to the drum and increase 60μ in indication.
9. Rotate the outer ring of the dial gauge to set the meter indication to zero.
   Slowly Rotate the middle drum until MAX deflection of meter is measures. Identify the type of head from the top of the centre drum. The minimum tip projection is as shown below.
10. If it is out of specification change the center drum.

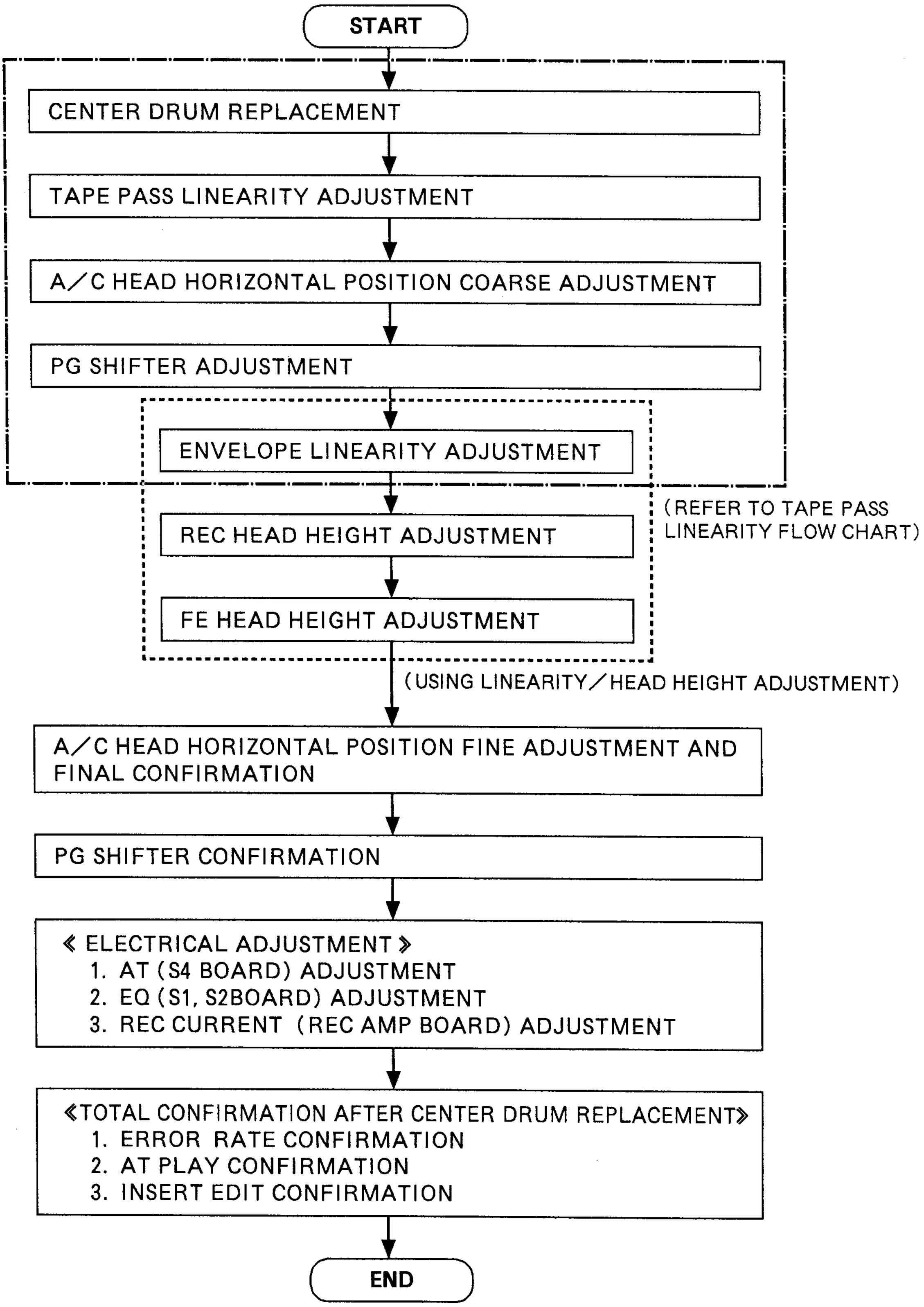
REC Head PROTRUSION: Normal 37μ– 42μ


Volume (B)
VFK0737B
HEAD TIP
CENTER DRUM
LOWER DRUM


Dial Gauge
0
20
20
40
40
[μm]
60
60
80
80
100
Original Set = 60μm
Reading = "Dmax"

Protrusion Amount Head Name	Head Protrusion Amount for New Head (CH0, CH1)	Standard of Replacement
R/P Heads (CH0 and CH1)	40^{+2}_{-3} [μm]	More than 17 [μm]
ERASE Heads	40^{+2}_{-3} [μm]	———

CENTER DRUM REPLACEMENT FLOW CHART


START
CENTER DRUM REPLACEMENT
TAPE PASS LINEARITY ADJUSTMENT
A/C HEAD HORIZONTAL POSITION COARSE ADJUSTMENT
PG SHIFTER ADJUSTMENT
ENVELOPE LINEARITY ADJUSTMENT
REC HEAD HEIGHT ADJUSTMENT
(REFER TO TAPE PASS LINEARITY FLOW CHART)
FE HEAD HEIGHT ADJUSTMENT
(USING LINEARITY/HEAD HEIGHT ADJUSTMENT)
A/C HEAD HORIZONTAL POSITION FINE ADJUSTMENT AND FINAL CONFIRMATION
PG SHIFTER CONFIRMATION
《ELECTRICAL ADJUSTMENT》
1. AT (S4 BOARD) ADJUSTMENT
2. EQ (S1, S2BOARD) ADJUSTMENT
3. REC CURRENT (REC AMP BOARD) ADJUSTMENT
《TOTAL CONFIRMATION AFTER CENTER DRUM REPLACEMENT》
1. ERROR RATE CONFIRMATION
2. AT PLAY CONFIRMATION
3. INSERT EDIT CONFIRMATION
END

AJ-D350 CENTER DRUM REPLACEMENT PROCEDURES

1. OPEN THE TOP PANEL

2. REMOVE THE HEAD CLEANING UNIT

Remove the two screws which are not glued.
One of the screw is under of the spring, so pull the spring knob and makes the space to insert a screw driver.

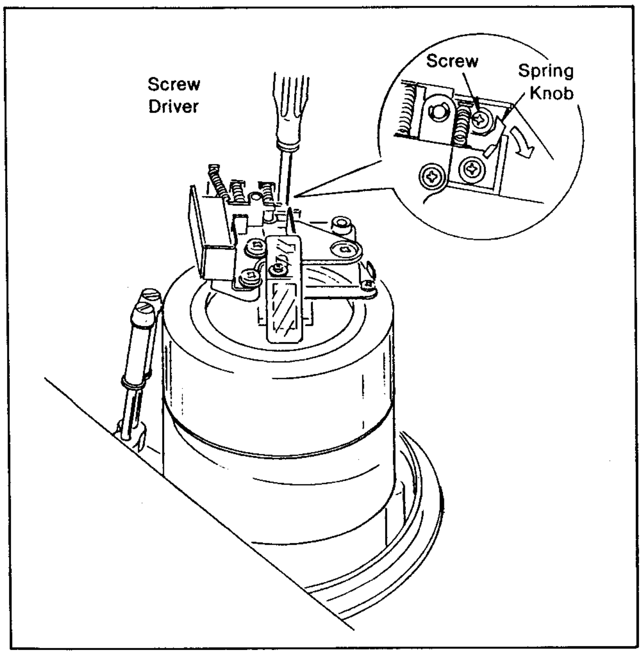
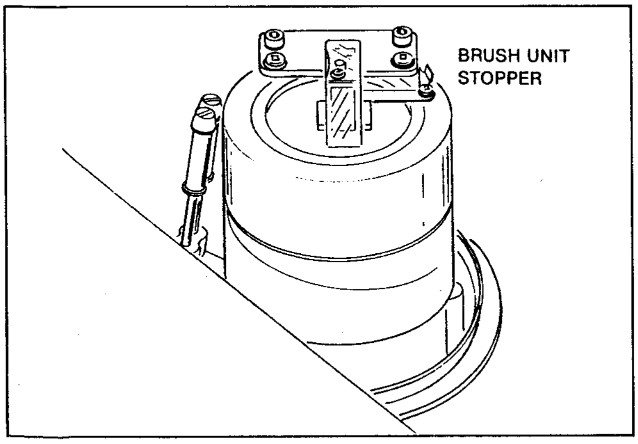

Screw Driver
Screw
Spring Knob

Fig. 8

3. REMOVE THE BRUSH UNIT

Loosen the screw of the brush unit stopper and separate the brush stopper unit from the brush unit, then rotates the brush unit about 90 degrees.
Remove the 2 screws (A) holding the brush unit in position see figure 9.


BRUSH UNIT STOPPER

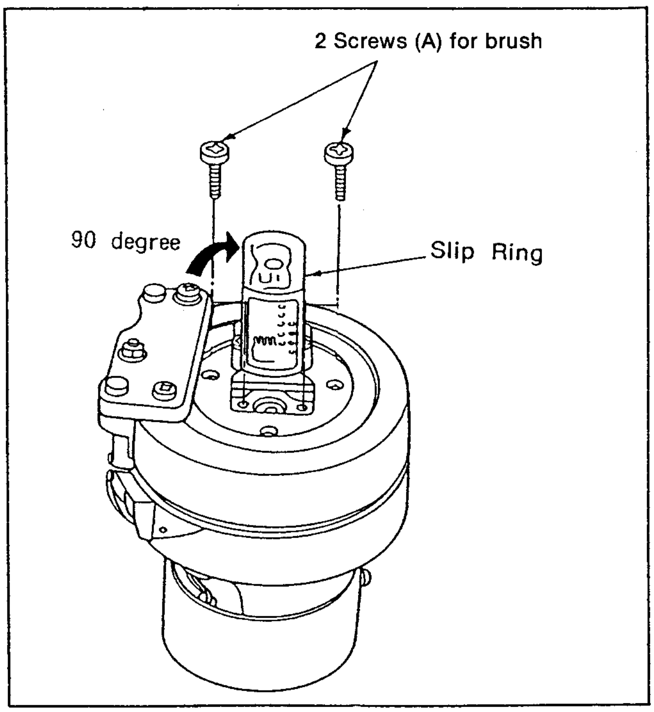
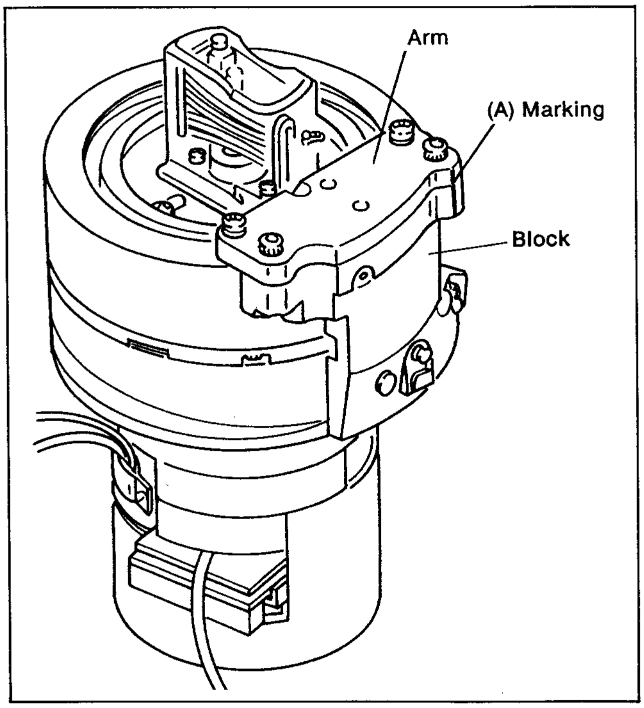

2 Screws (A) for brush
90 degree
Slip Ring

Fig. 9

4. REMOVE THE UPPER DRUM

Before removement, mark the A portion by marker pencil for setting position of arm and block as shown in Figure.


Arm
(A) Marking
Block

Clean the arm block and upper drum of attachment portions (A, B and C portions) as shown in Figure 23.

Unscrew the two hex screws on the upper drum by torque wrench B.
Unscrew the one hex screw on the back side of the upper drum by torque wrench A, the torque wrench A must select the rotation angle by the selector and it is necessary to attach the torque wrench adaptor.
Remove the Upper Drum unit.

Note: Place upper drum up side down on work surface.
The lower edge must not be damaged.

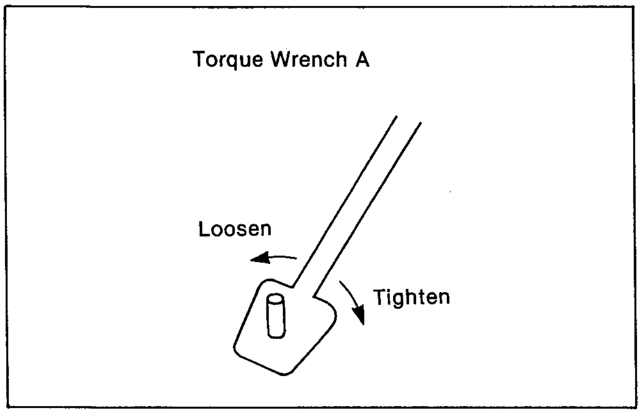

Torque Wrench A
Loosen
Tighten

Fig. 11

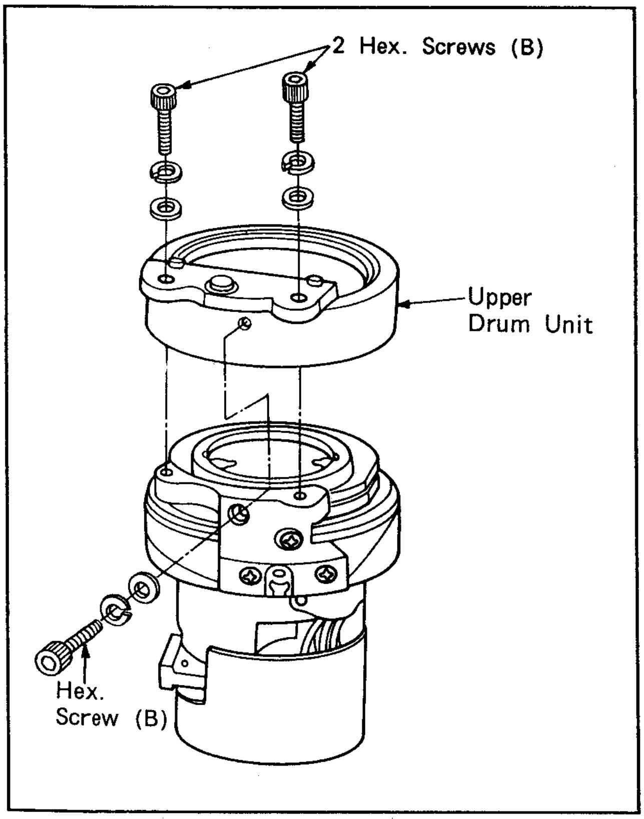

2 Hex. Screws (B)
Upper Drum Unit
Hex. Screw (B)

Fig. 12

5. REMOVE THE CENTER DRUM

Unscrew the two screw of the Center Drum and remove the Center Drum.
When replacing the Center Drum, it has two direction, so the correct direction of the Center Drum head A and B must be remembered.

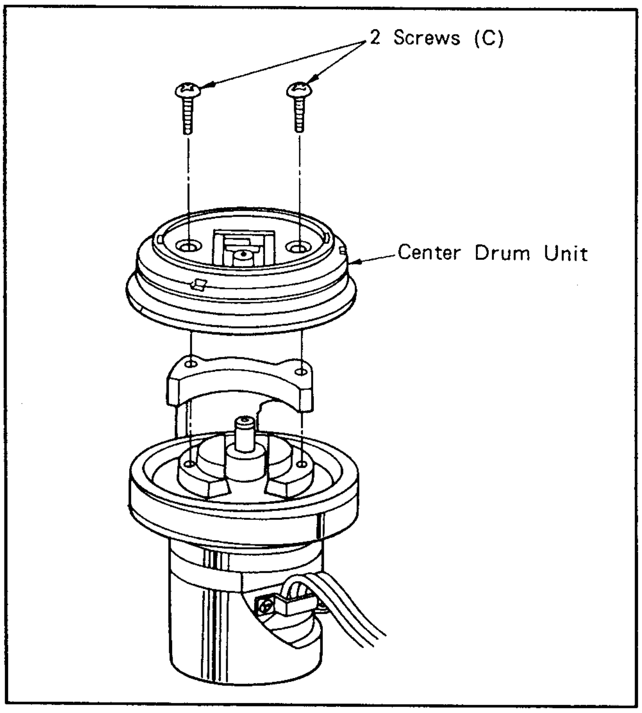

2 Screws (C)
Center Drum Unit

Fig. 13 Center Drum Removal

6. SET THE CENTER DRUM

Clean the tape path of the Lower Drum unit (A, B and C portions).
Check where the head chips are located and pick up the Center Drum so that your fingers never touch the head chips.
Set the Center Drum as same direction on the Lower Drum so that the head chips never touches at any place of the Lower Drum, and slightly tighten the two screws.

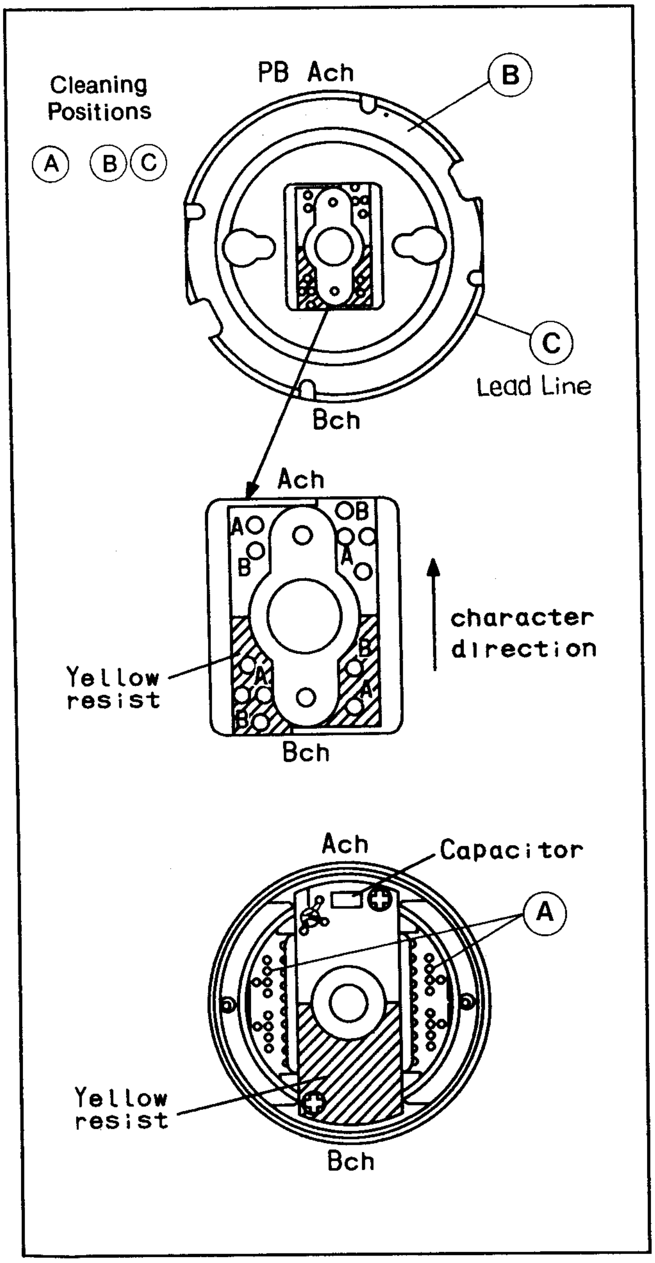


Fig. 14

7. ECCENTRIC ADJUSTMENT

1) DRUM REPLACEMENT TOOL SETUP-VFK0737B
The Drum Replacement tool has two functions, one is center drum eccentric adjustment and the other is head chip protrusion measurement.
Therefore it is necessary to select these functions.
To select the functions there are two set up portions, one is height of the dial meter and the other is head contact portion angle.
The dial meter height is changed by turning the attachment shaft. For the eccentric adjustment the dial meter is in the higher position because the measurement portion must not touch the heads and must touch the road which is just above the head chips. For the head chip protrusion measurement, the measurement pick portion must touch the head chips, so the dial meter must be lower position as shown in Figure 15.

The other setup portion of this tool is head contact portion angle. For the eccentric adjustment the head contact is horizontal to run smoothly on the surface of the center drum and for the protrusion measurement the head contact is vertical to cross the head chips. The angle can be changed by finger, but the pick tool is useful to change this contact portion easily.

2) Set the attachment shaft is upper portion by turning the center screw clockwise.

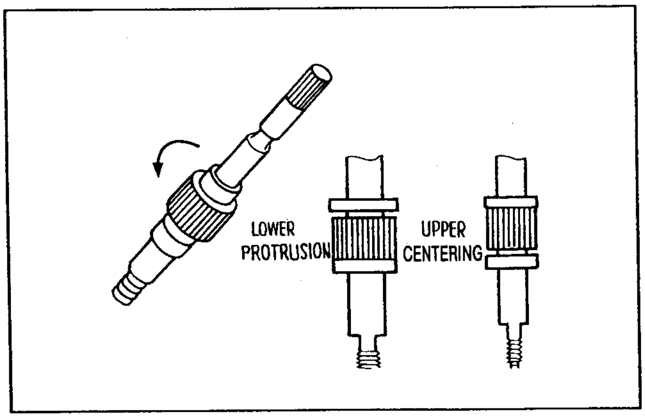


Fig. 15 Attachment Shaft

3) Set the head contact portion to the horizontal position.

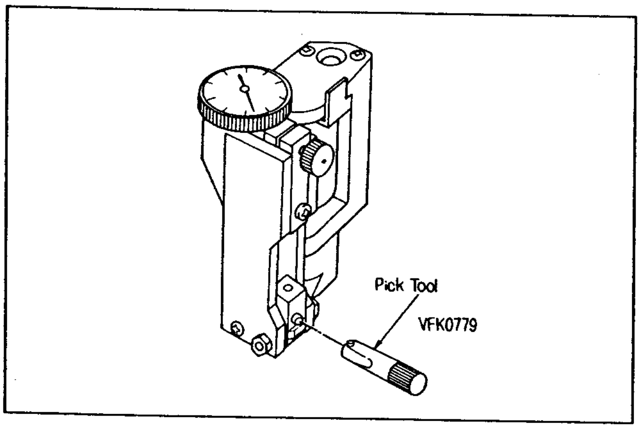

Pick Tool
VFK0779

Fig. 16 Pick Tool

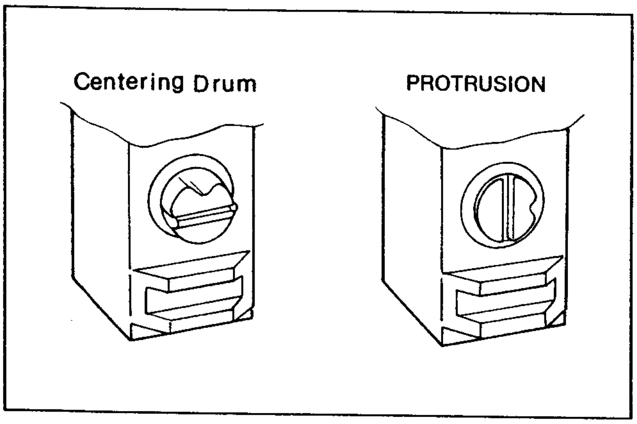

Centering Drum
PROTRUSION

Fig. 17 Pick Tool

4) Install the attachment shaft at mechanism chassis.

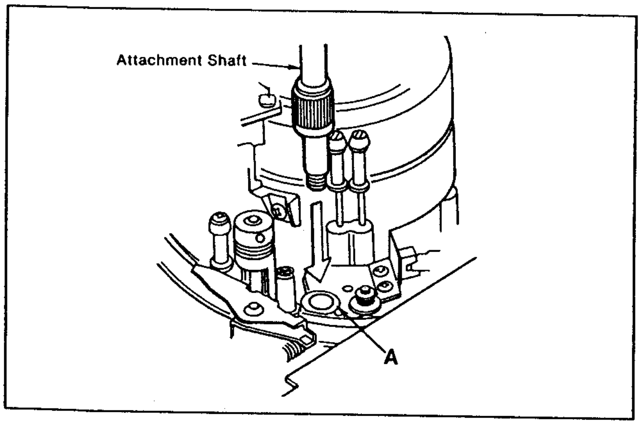

Attachment Shaft
A

Fig. 18 Attachment Shaft

5) Set the main unit of the drum replacement tool at the attachment shaft.

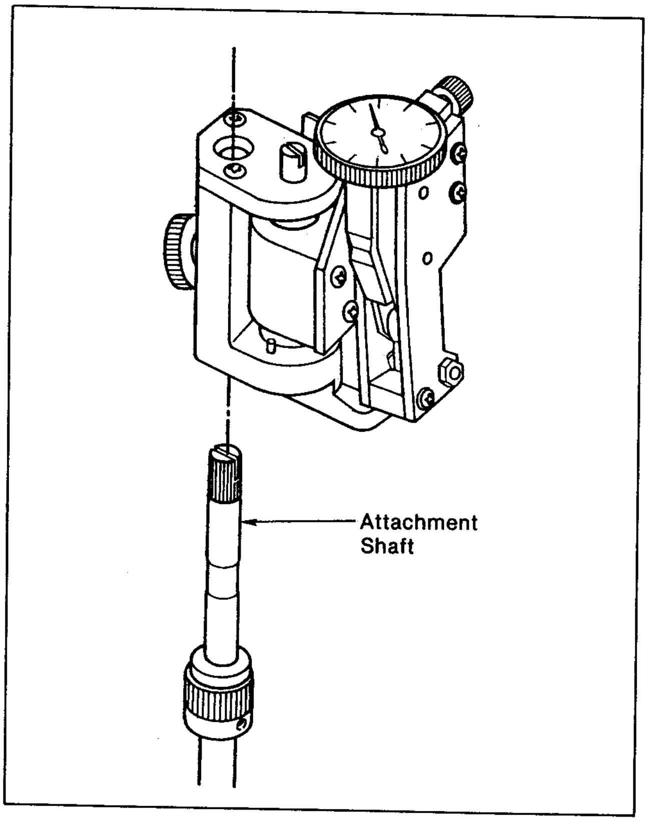

Attachment Shaft

Fig. 19 Center Drum Replacement Tool

6) Confirm that the lever of center drum replacement tool is locked and install it to attachment shaft.

7) Set the attachment plate to touch the lower drum, and fix the knob by rotating the screw.

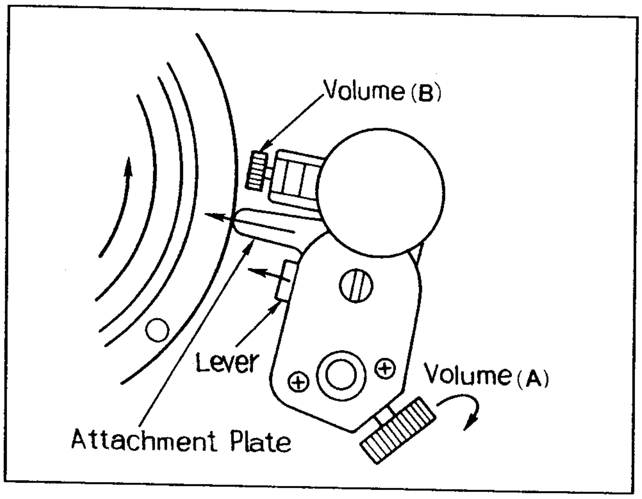

Volume (B)
Lever
Volume (A)
Attachment Plate

Fig. 20 Attachment Tool

8) Set the dial gauge to zero position.
Adjust the knob of the center drum replacement tool of the head adjustment place so that the pick up point touches the drum and increase to 60 um indication.

9) Rotate the outer ring of the dial gauge to set the meter indication to zero. Rotate the center drum if it is not concentric with its axis of rotation the meter will swing back and forth, indicating the amount of error. The maximum allowable tolerance is within +/- 1 um.

10) If it is out of specification, adjust the position of the middle drum by tapping lightly with the plastic handle of a screwdriver on the side of the drum apposite from the point of measurement. When the eccentricity is within +/- 1 um, gently tighten the 2 screws. Check eccentricity to make sure it is within specification. If it is out, repeat this procedure.

11) Tighten the 2 screws of the center drum securely with torque wrench and check eccentricity again. If it is within ± 1 um pull the drum replacement tool away from the drum.

12) Clean the block and upper drum of attachment surfaces (A,B and C portions) as shown in Figure 23. Remove the drum replacement tool and attachment shaft.

13) Reinstall the upper drum and tighten loosely the 2 hex screws of top of the arm and block using the torque wrench B.

14) Tighten loosely the hex screw which is located at the back of the block (screw E) using the torque wrench.
Confirm that there is a small allowance for upper drum morement.

15) Match the marking on arm and block and tighten the hex screw (E) which is located at back side of the lower drum by using the torque wrench A to 6kg. And tighten the 2 hex screws (D) of top of it by using the torque wrench to 8kg.

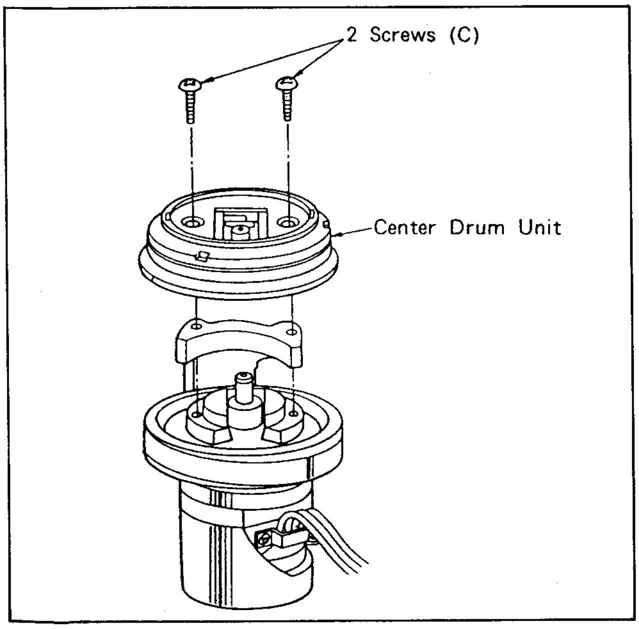

2 Screws (C)
Center Drum Unit

Fig. 21 Center Drum

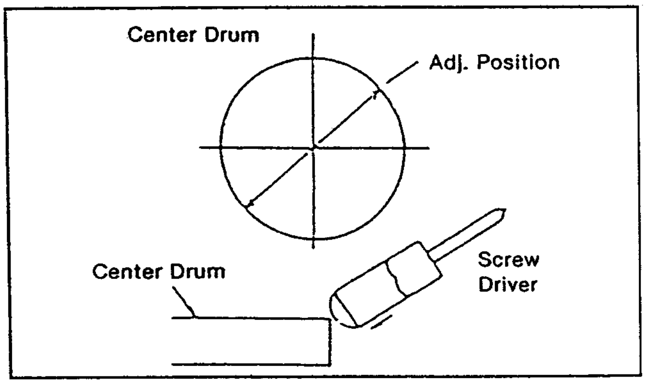

Center Drum
Adj. Position
Center Drum
Screw Driver

Fig. 22 Adjustment Position

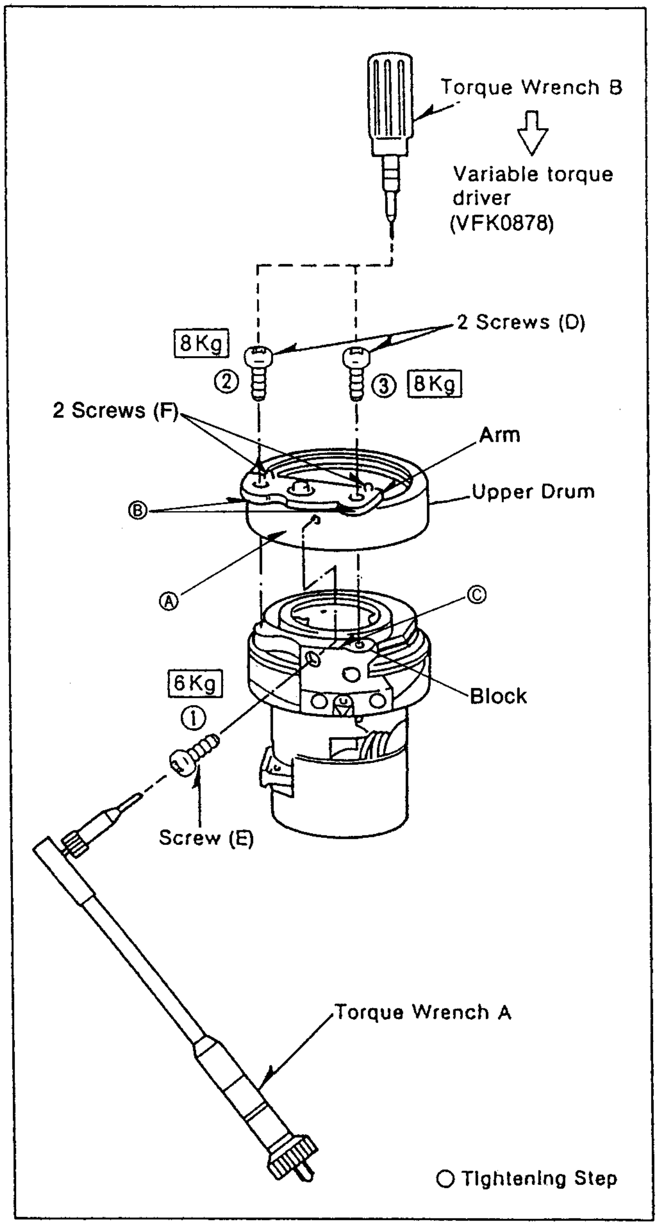
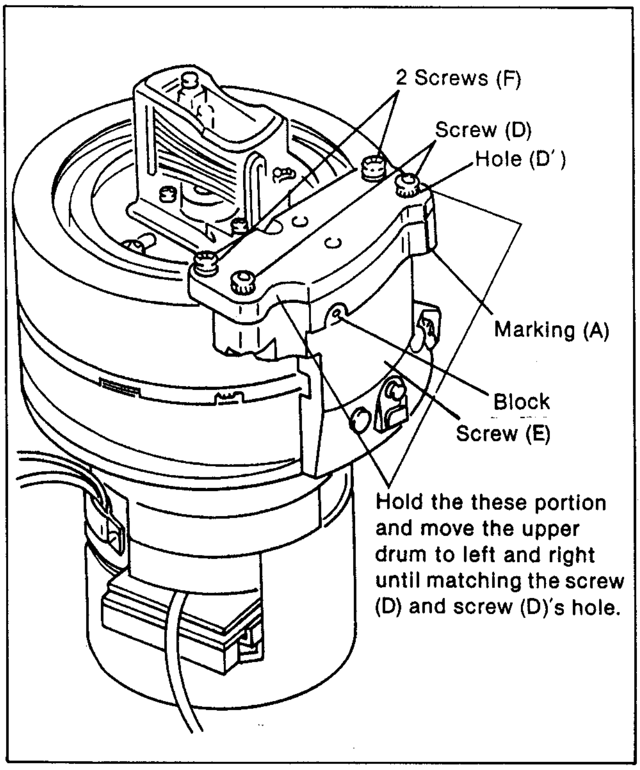

Torque Wrench B
Variable torque driver (VFK0878)
8Kg
②
③
8Kg
2 Screws (D)
2 Screws (F)
Arm
Upper Drum
Ⓑ
Ⓐ
Ⓒ
6Kg
①
Block
Screw (E)
Torque Wrench A
○ Tightening Step

Fig. 23 Install Upper Drum

UPPER DRUM INSTALLATION and ADJUSTMENT

(1) Tighten the hex screw (E) matching the arm and block by using the torque wrench A to 6kg.
(2) Loosen the 2 screws (F) until release the spring washer, and match the screw (D) and screw (D)'s hole moving the upper drum to left and right by hand.
(3) Tighten the 2 screws (D) matching the arm and block by using the torque wrench to 8kg.
(4) Tighten the 2 screws (F) by using the torque wrench to 6kg.
(5) Erase the marking (A) by using the cleaning cloth.


2 Screws (F)
Screw (D)
Hole (D')
Marking (A)
Block
Screw (E)

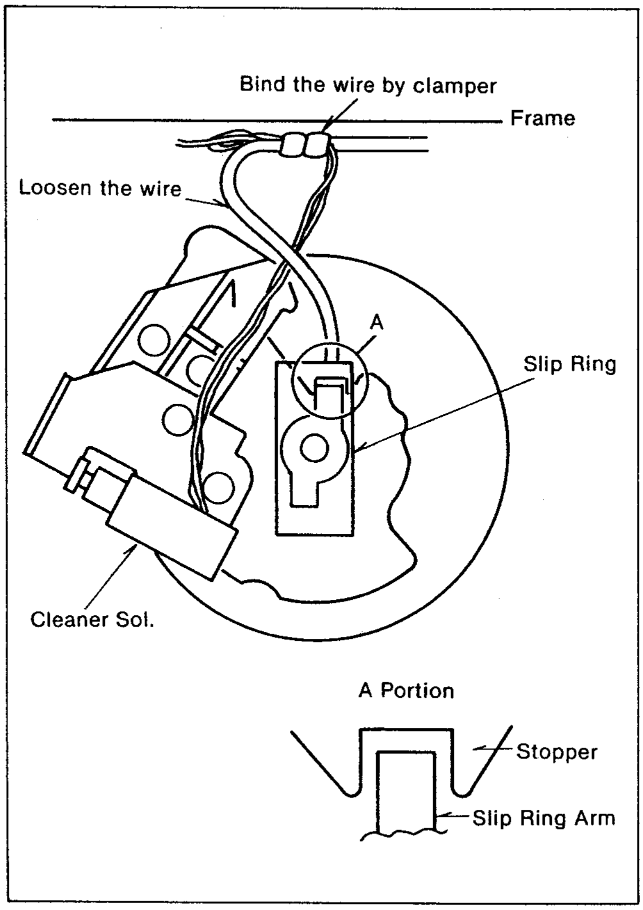
Hold the these portion and move the upper drum to left and right until matching the screw (D) and screw (D)'s hole.

16) Reinstall the slip ring and tighten the 2 screws.

17) Reinstall the cleaner roller unit to the original position.

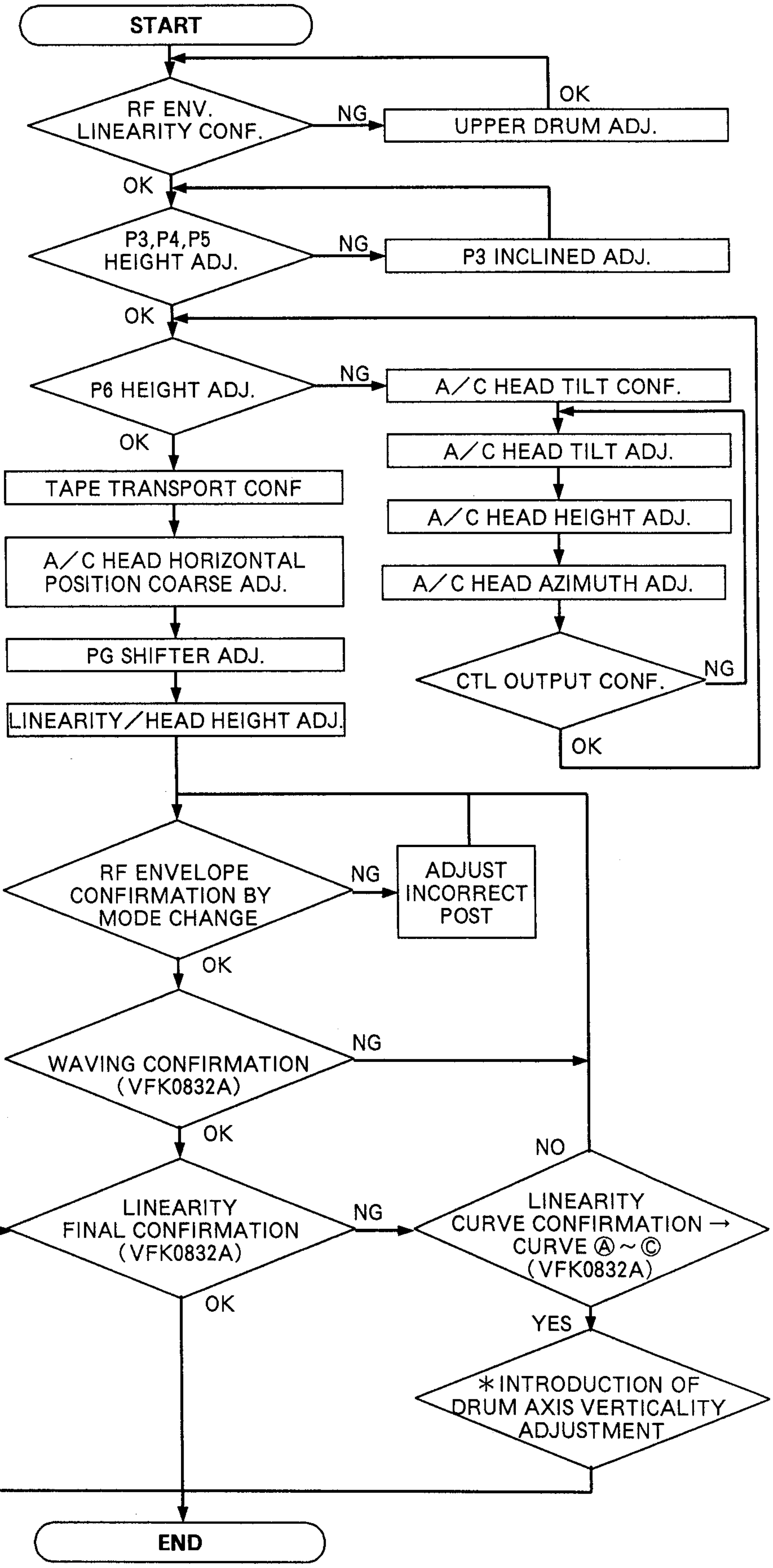
18) After install the slipring and cleaner roller, bind the wire using clamper as follows.

* Make loosen the wire when it is binded.


Bind the wire by clamper
Frame
Loosen the wire
A
Slip Ring
Cleaner Sol.
Stopper
Slip Ring Arm

A Portion

TAPE PASS LINEARITY ADJUSTMENT FLOW CHART

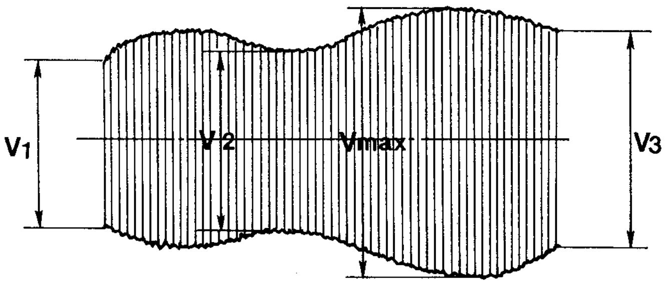

START
RF ENV. LINEARITY CONF.
NG
UPPER DRUM ADJ.
OK
OK
P3,P4,P5 HEIGHT ADJ.
NG
P3 INCLINED ADJ.
OK
P6 HEIGHT ADJ.
NG
A/C HEAD TILT CONF.
A/C HEAD TILT ADJ.
A/C HEAD HEIGHT ADJ.
A/C HEAD AZIMUTH ADJ.
CTL OUTPUT CONF.
NG
OK
OK
TAPE TRANSPORT CONF
A/C HEAD HORIZONTAL POSITION COARSE ADJ.
PG SHIFTER ADJ.
LINEARITY/HEAD HEIGHT ADJ.
RF ENVELOPE CONFIRMATION BY MODE CHANGE
NG
ADJUST INCORRECT POST
OK
WAVING CONFIRMATION (VFK0832A)
NG
OK
LINEARITY FINAL CONFIRMATION (VFK0832A)
NG
LINEARITY CURVE CONFIRMATION → CURVE Ⓐ~Ⓒ (VFK0832A)
NO
YES
*INTRODUCTION OF DRUM AXIS VERTICALITY ADJUSTMENT
OK
END

*If the specification is not satisfied after some adjustments, Drum unit may be wrong.

RF ENVELOPE LINEARITY CONFIRMATION

1. Confirm that the RF envelope is shown below.
2. In the VAR × -1 mode, confirm the diamond shape envelope as shown below.
3. If out of specification, adjust upper drum position, P3, P4, P5 of entrance posts height.

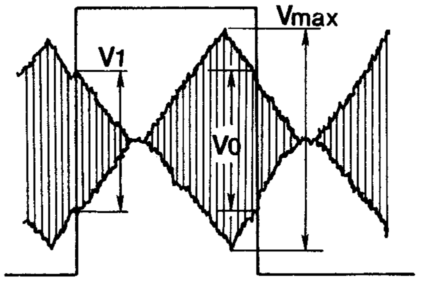
TEST	TP11 or TP12 (REC AMP BOARD), TP37 (H.SW)[D4](SERVO BOARD)	
SPEC	LINEAR MASTER PLAY	V1/Vmax, V2/Vmax, V3/Vmax ≥ 0.92
	SELF RECORDING PLAYBACK	V1/Vmax, V3/Vmax ≥ 0.9, V2/Vmax ≥ 0.95
	SELF RECORDING PLAYBACK	Modulation of Envelope is less than 5% at maximum envelope portion.
	SELF RECORDING VAR X-1	$\left(\frac{V1-V0}{Vmax}\right) \le 0.2$
	SELF RECORDING VAR X1	V1/Vmax, V2/Vmax, V3/Vmax ≥ 0.92
	CONFIDENCE PLAYBACK	V1/Vmax, V2/Vmax, V3/Vmax ≥ 0.85
MODE	LINEAR MASTER PLAYBACK	
	SELF RECORDING PLAYBACK (COLOR BAR or MONOSCOPE)	
	ADJUST TRACKING VR and SET ENVELOPE IS MAXIMUM.	
TOOL	1. POST DRIVER 2. HEX. WRENCH M2.6	



Mode: Play

If out of specification, P3, P6 and Upper drum adjustment is required as follows.

V_1 : P3 post Height Adj.
V_2 : UPPER DRUM POSITION Adj.
V_3 : P6 post Height Adj.



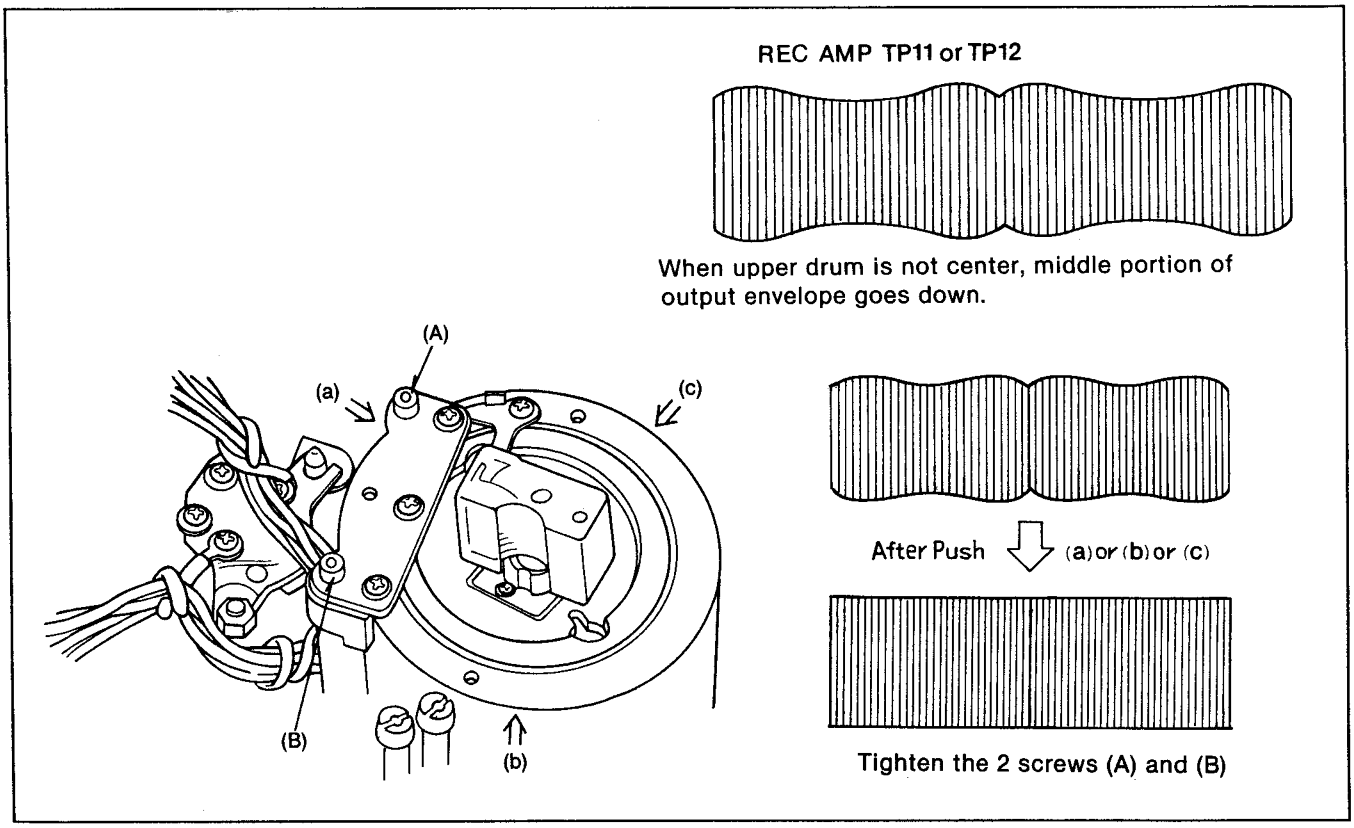
Mode: VARX-1

$V_0 \fallingdotseq V_1$: P4 and P5 or Upper drum position Adj.

UPPER DRUM ADJUSTMENT

TEST	TP11, TP12 (REC AMP Board), TP37 [D4] (H SW) (SERVO Board)
MODE	Alignment Tape (2) LINEAR portion PLAY mode
SPEC	RF Envelope keeps flat when the tracking VR is adjusted

1. If out of specification, loosen the 2 screws (A) and (B) and push the (a), (b) and (c) portions to find the envelope flat portion.
2. Tighten the 2 screws (A) and (B) by 8kg torque using torque wrench (B) while holding the upper drum at best condition of output envelope.



When upper drum is not center, middle portion of output envelope goes down.

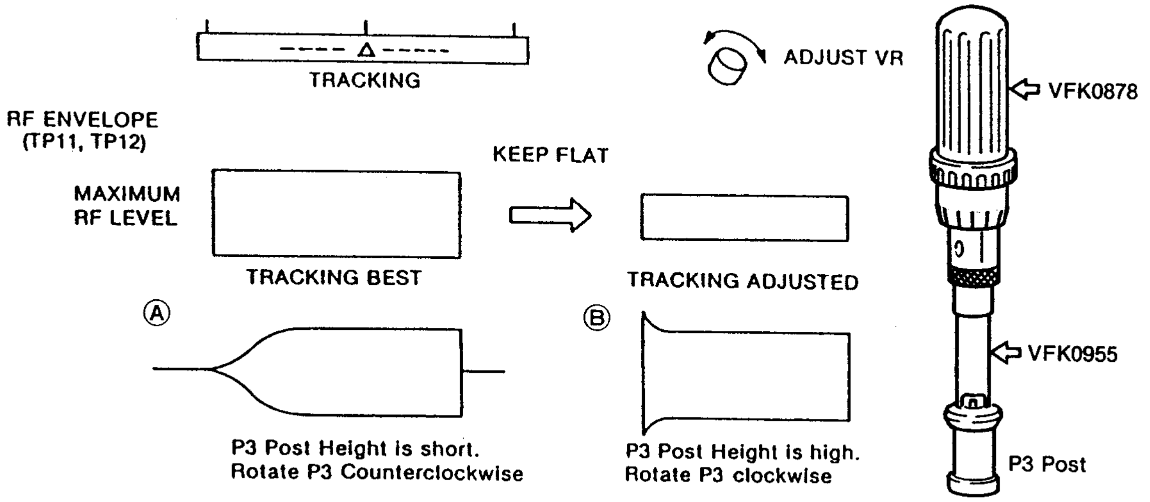
Tighten the 2 screws (A) and (B)

Note: As Envelope waveform is changed according to upper drum, P3, P4, P5, P6 and A/C Head, the envelope waveform is not flat only this adjustment.

P3 POST HEIGHT ADJUSTMENT

TEST	TP11, TP12 (REC AMP P.C.BOARD), TP37[D4](H.SW) (SERVO P.C.BOARD)
MODE	LINEAR MASTER TAPE, PLAY mode (confirmation) STOP mode (adjustment)
MACHINE CONDITION	Select the TEST MENU → Select the RF mode → Select the TRACKING mode → Set the VAR mode
SPEC	RF Envelope keeps flat when the tracking VR is adjusted
TOOL	POST DRIVER VFK0293, VFK0910, VFK0912, VFK0878 and VFK0955

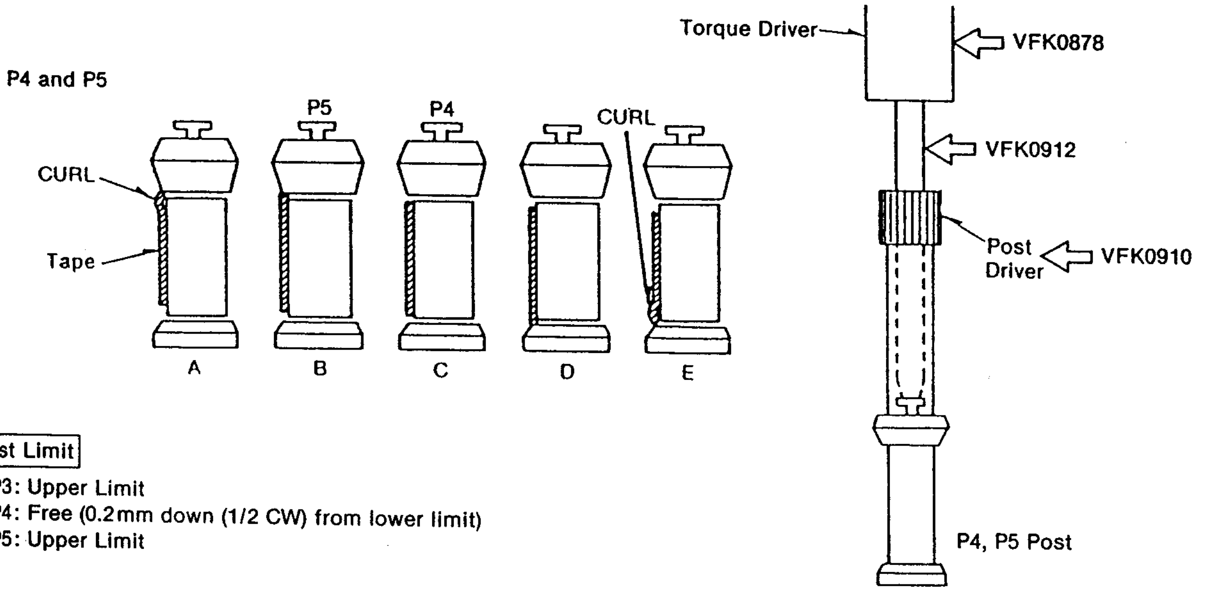
1. If the tape curling occurs at the tape path, place the unit in the STOP mode to protect for tape damage and re-adjust the post height.
2. Set the adjustable torque driver (VFK0878) to 2.5Kg.
3. Set the P4 and P5 to no limit (Free) by using VFK0910, VFK0912, and VFK0878 (post driver with adjustable torque driver).
4. Adjust P3 post by using VFK0293.
5. Confirm that the RF envelope keep flat when the tracking VR is adjusted in PLAY mode.
6. Tighten the upper flange (with 2.5Kg torque) of P3 by using torque driver and VFK0955.
7. After adjustment of P3 post, set the P4 and P5 to original limit. Be sure that there is no curl on the tape.
8. If out of specification yet check the P3 post Inclined angle adjustment.


TRACKING
ADJUST VR
RF ENVELOPE (TP11, TP12)
MAXIMUM RF LEVEL
KEEP FLAT
TRACKING BEST
TRACKING ADJUSTED
Ⓐ
Ⓑ
VFK0878
VFK0955
P3 Post

P3 Post Height is short.
Rotate P3 Counterclockwise

P3 Post Height is high.
Rotate P3 clockwise

*When tighten the P4 and P5 posts, torque value is 2.5Kg by using the torque driver.


Torque Driver
VFK0878
P4 and P5
P5
P4
CURL
CURL
Tape
A
B
C
D
E
VFK0912
Post Driver
VFK0910
P4, P5 Post

Post Limit

P3: Upper Limit
P4: Free (0.2mm down (1/2 CW) from lower limit)
P5: Upper Limit

CONFIRMATION OF P3 POST INCLINED ANGLE

In order to check the P3 tilt, Perform the following checks

Check 1 :

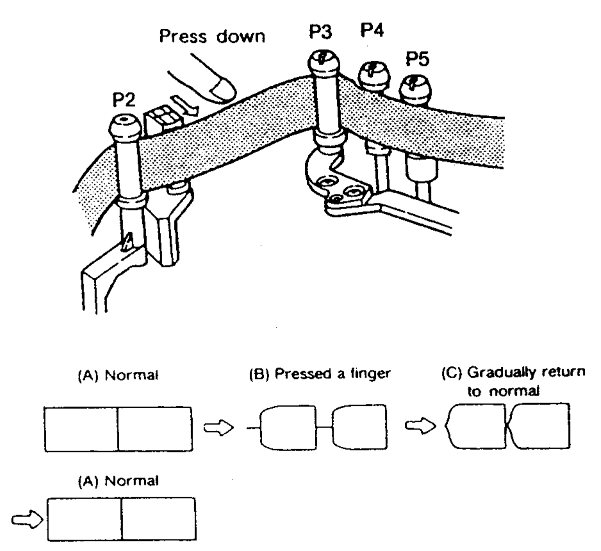
Play back the pre-recorded tape and place the unit in the FWD and REV mode.
(FWD/REV as capstan on condition)
Confirm that the P3 post is upper limit and no tape deforming during these mode.
If it is not, adjust the P3 post tilt using the tilt fixture.

Check 2 :

Place the unit in the PLAY mode.
Gently press down on the upper edge of the tape as shown in figure.
Displace the tape as necessary to achieve the (B) waveform as shown in figure.
Then release the tape. The envelope will change from (B) to (C) and back to (A).
If the P3 post is properly adjusted, it will take from 1 to 2 seconds to change from (B) to (C) to (A).

If there is not enough tilt to the P3 post, it will take more than 2 seconds for the envelope to change from (B) to (C) to (A). If in this case, readjust the P3 post using the tilt fixture.

If the P3 post has too much tilt, it will take less than 1 second for the envelope to change from (B) to (C) to (A). Adjust the P3 post tilt using the tilt fixture to achieve a setting time of 1 to 2 seconds.



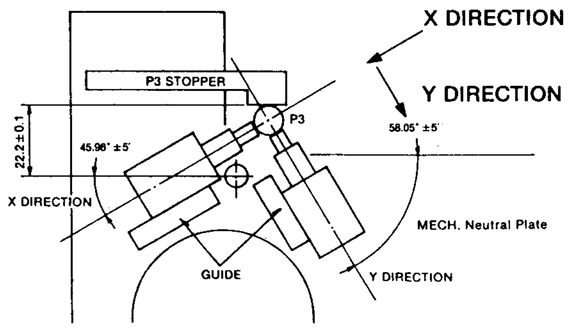
P3 Post inclined angle adjustment (Factory Adjustment only)

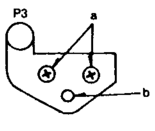
SPEC	X direction 33μm (16.11' ± 5') Y direction 51μm ± 10μm (24.90' ± 5')
MODE	P3 Stopper touch condition (Manual sub-loading)
TOOL	Mech. Neutral Plate with P3 stopper Micro Meter and Pick up (7mm pitch), Pick up Fixture Micro Meter calibration block

1. Turn the power off.
2. Remove the cassette compartment with the connector.
3. Turn the power ON and set the VTR into NO TAPE M CASSETTE mode.

   TEST → F4 (MECHA)→ F1 (NO TAPE)
   Confirm F3 (C SIZE) is M → STOP

4. Set the neutral plate with P3 stopper on the reel base.
5. Set the Micro Meter pick up to the pick up fixture with M3 screw.
6. Calibrate the Micro meter pick up reference position with the calibration block. (Refer to setting of Micro Meter)
7. Rotate the sub-loading motor until the P3 post (tension post) just touched with the P3 stopper.
8. Set the Micro Meter pick up to the guide (X direction) and (Y direction) and measure the angle.
9. If the angle of X and Y direction are not within specification adjust screw a and b so that the angle of X and Y direction are within specification.
10. Glue the screw a and b.





SPEC=X 33μm±10μm (16.11° ±5′)
Y 51μm±10μm (24.9° ±5′)
X DIRECTION "a"
Y DIRECTION "a" and "b"

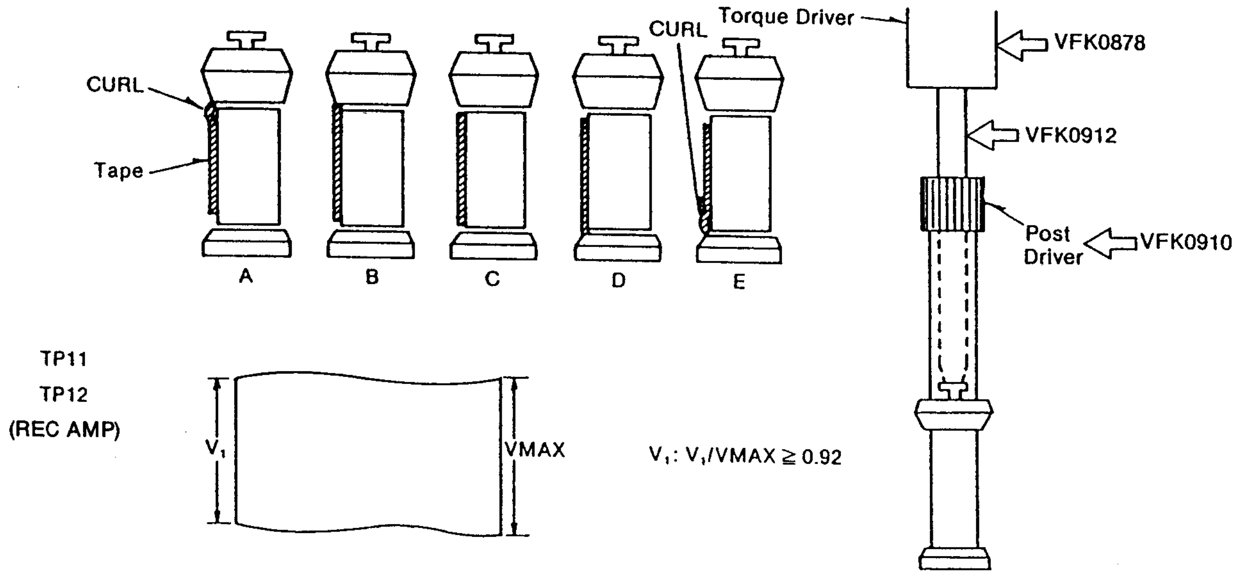
P4, P5 POST HEIGHT ADJUSTMENT

	LIMIT (PLAY mode)	TAPE HEIGHT					ADJUSTMENT
		A	B	C	D	E	
P4 POST	Free			O			Adjust P4 post to free.
P5 POST	Upper Limit		O				Just press upper limit without Tape curl.

TAPE	TP11, TP12 (REC AMP BOARD), TP37 (H.SW)(SERVO BOARD)
SPEC	Output envelope is flat
MODE	LINIEAR MASTER PLAY (P4, P5 Post)
TOOL	Post Driver (VFK0878, VFK0912 and VFK0910) Check Mirror

1) Set the VTR to VAR x-1 and VAR x 3 alternately and confirm that the tape curling at lower and upper flange on the P2 and P3 post are not appeared.
2) Set the VTR to FF and REW mode alternately and confirm that the tape curling at lower and upper flange on the P2 and P3 post are not appeared.
3) If appear the tape curling, adjust the P5 post height so that the tape curling is disappeared on the each modes (VAR x-1 to VAR x 3 / FF and REW).

* When tighten the each posts, torque value is 2.5Kg by using the torque driver.

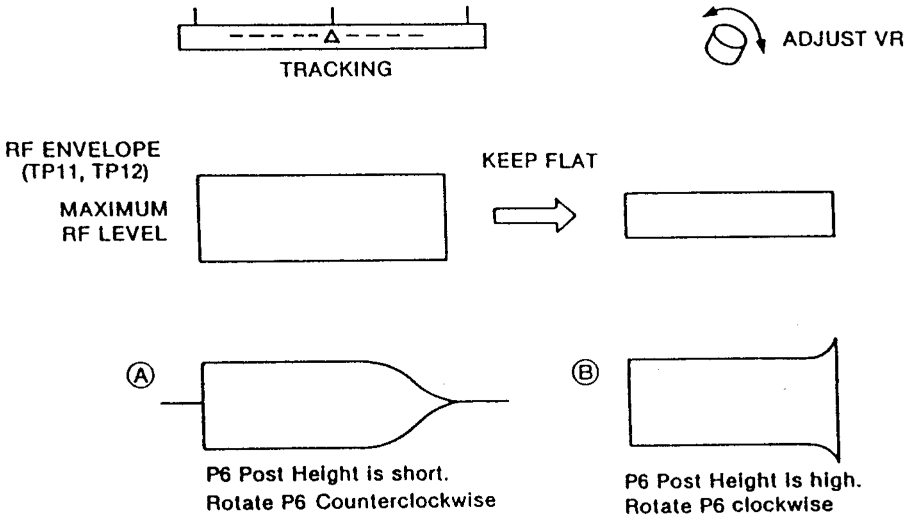

CURL
Tape
CURL
Torque Driver
VFK0878
VFK0912
Post Driver
VFK0910
A
B
C
D
E
TP11
TP12
(REC AMP)
V₁
VMAX
V₁: V₁/VMAX ≧ 0.92

P6 POST HEIGHT ADJUSTMENT

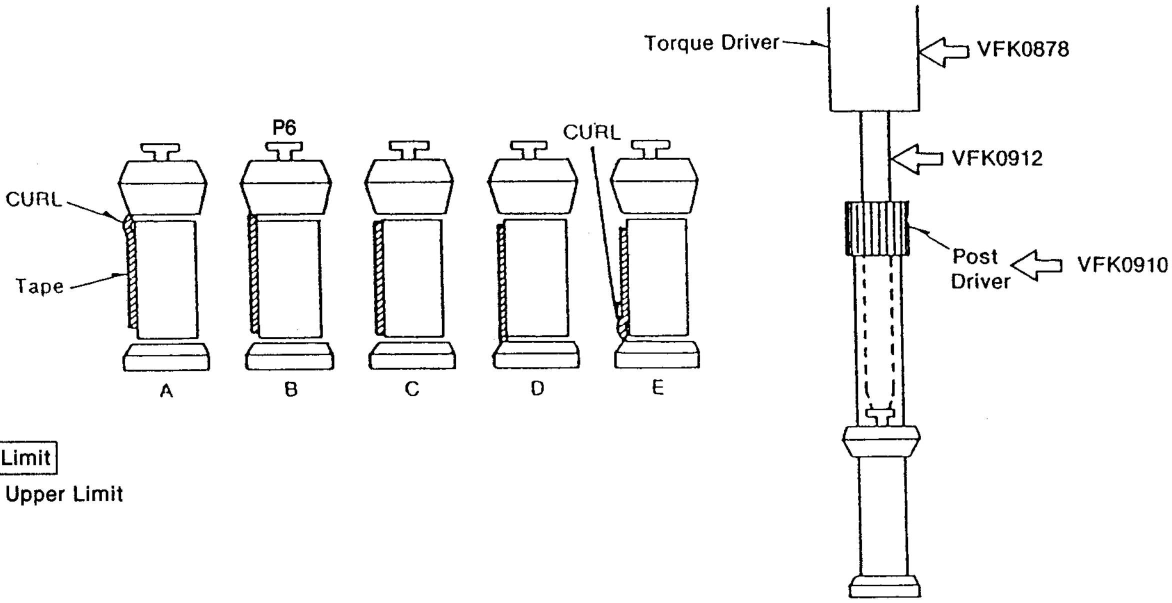
TEST	TP11, TP12 (REC AMP P.C.BOARD), TP37[D4](H.SW) (SERVO P.C.BOARD)
MODE	Alignment tape (2) LINEAR portion, PLAY mode (confirmation) STOP mode (adjustment)
MACHINE CONDITION	Select the TEST MENU → Select the RF mode → Select the TRACKING mode → Set the VAR mode
SPEC	RF Envelope keeps flat when the tracking VR is adjusted
TOOL	POST DRIVER (VFK0293) → VFK0910, VFK0912 and VFK0878

1. Set the variable torque driver to 2.5Kg.
2. Adjust P6 post by using VFK0910, VFK0912 and VFK0878 (post driver with adjustable torque driver).

Note: If it is out of specification, confirm the A/C Head tilt adjustment.


TRACKING
ADJUST VR
RF ENVELOPE (TP11, TP12)
MAXIMUM RF LEVEL
KEEP FLAT
Ⓐ
Ⓑ
P6 Post Height is short.
Rotate P6 Counterclockwise
P6 Post Height is high.
Rotate P6 clockwise

*When tighten the P6 post, torque value is 2.5 Kg by using into torque driver.


Torque Driver
VFK0878
VFK0912
Post Driver
VFK0910
P6
CURL
CURL
Tape
A
B
C
D
E

Post Limit

P6: Upper Limit

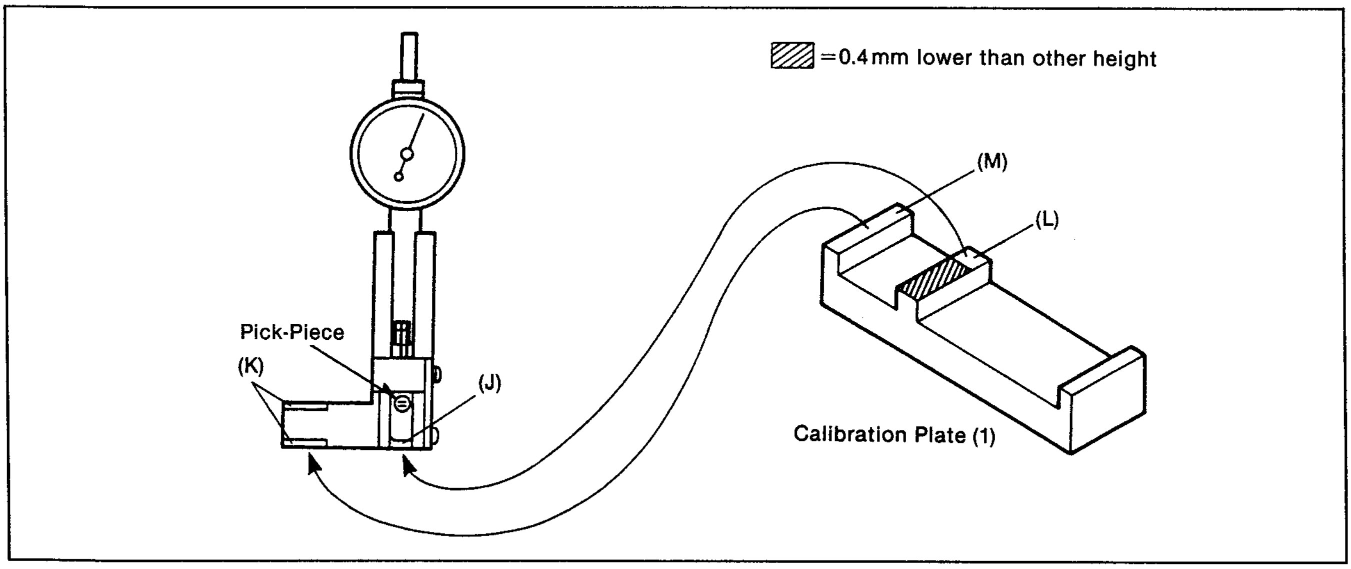
A/C HEAD TILT CONFIRMATION

Before adjust A/C Head Tilt, please confirm A/C Head tilt using tilt tool. This Tool is for coarse check of A/C Head tilt, therefore final confirmation is necessary checking with cue audio level, CTL pulse level and RF envelope.

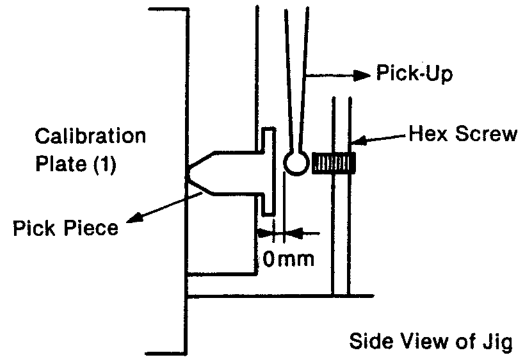
Tool List:	A/C Head Tilt Tool (VFK1008)
	Calibration Plate (1)(VFK1007)
	Calibration Plate (2)(VFK1006)

1. CALIBRATION PROCEDURE

1) Attach the calibration Plate (1) to the A/C Head Tilt Tool as shown below.
   J and L, K and M should touch each other.

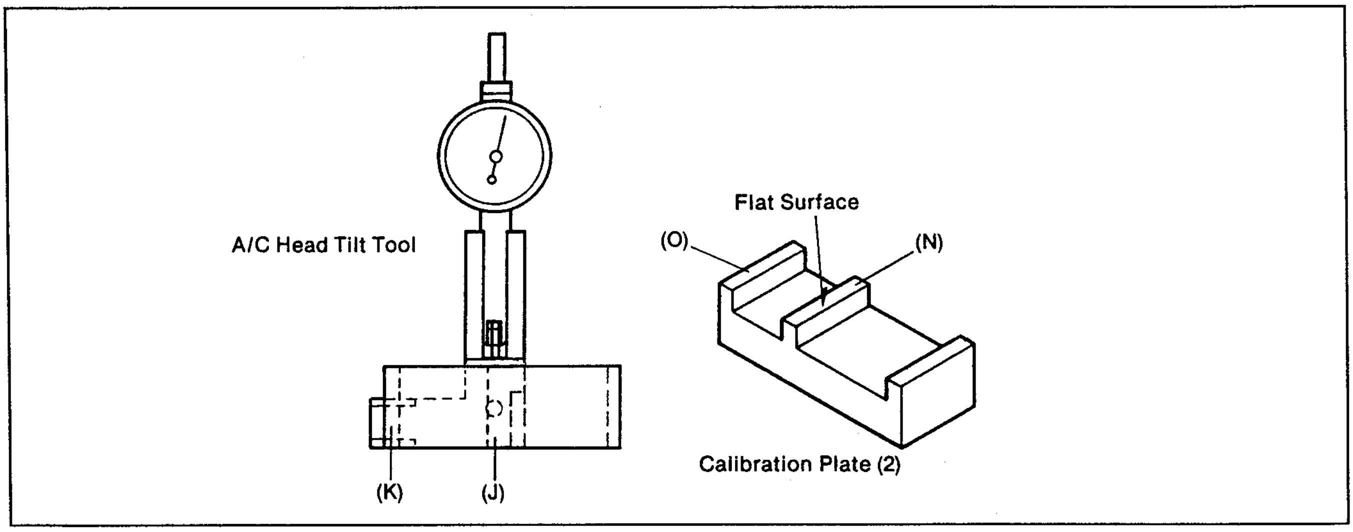

▨ =0.4mm lower than other height
(M)
(L)
Pick-Piece
(K)
(J)
Calibration Plate (1)

2) Gently press the Pick Piece of A/C Head Tilt Tool from rear side so that the pick piece is protruded from reference surface about 0.4mm with calibration plate (1) as shown below.


Pick-Up
Hex Screw
Calibration
Plate (1)
Pick Piece
0mm
Side View of Jig

3) Turn the Hex screw clockwise so that the Pick-up touches the Pick-piece slightly. Then turn the Hex screw two turn counterclockwise.

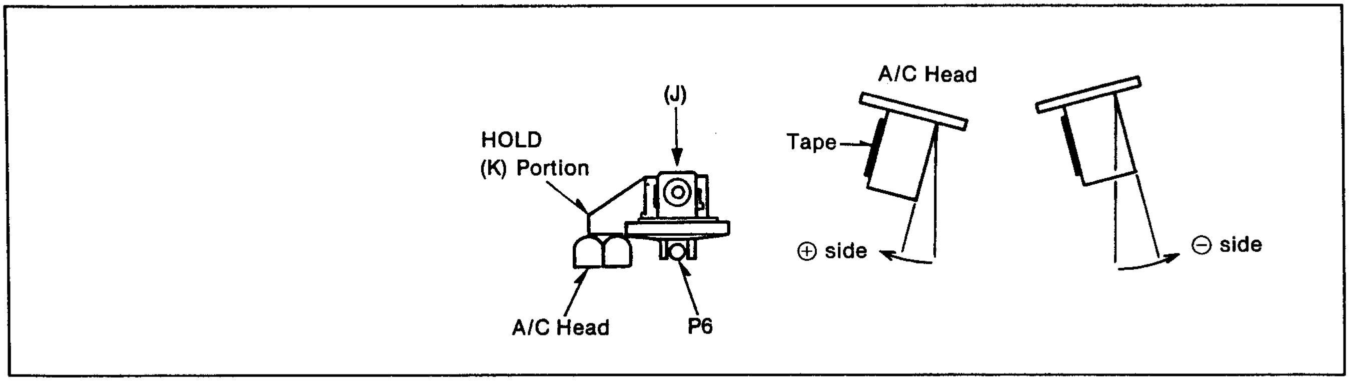
4) Attach calibration plate (2) to the A/C Head Tilt Tool as shown below.
J and N, K and O should touch.


A/C Head Tilt Tool
Flat Surface
(O)
(N)
Calibration Plate (2)
(K)
(J)

5) Hold (K) portion and gently press at (J) to set the dial gauge reading to "0".
6) Remove the Calibration Plate (2) and confirm that the gauge reading is -300μ ~ -500μ with no pressure.
7) If it is not, repeat step 1) ~ 5) until gauge reading is -300μ ~ -500μ.

2. MEASURING PROCEDURE

1) Gently install the A/C head Tilt Tool onto the P6 Post.


(J)
HOLD
(K) Portion
A/C Head
P6
A/C Head
Tape
⊕ side
⊖ side

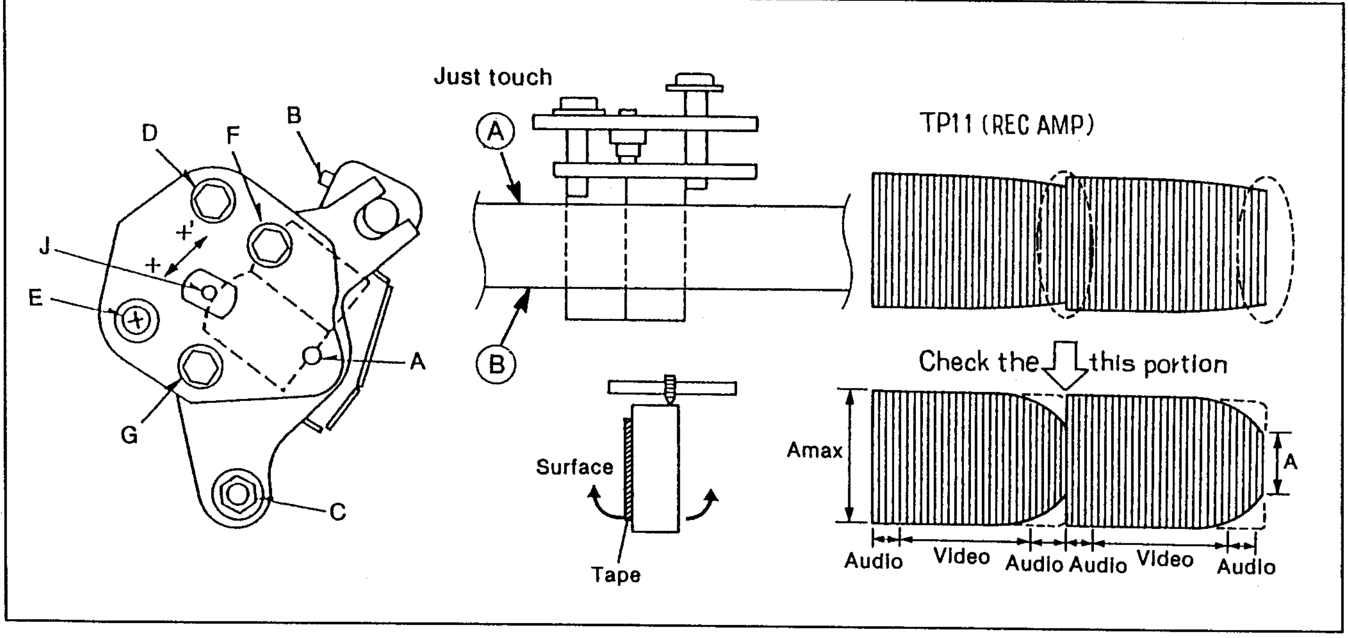
2) Hold (K) portion as reference and getly press (J) portion to measure tilt reading.
3) Confirm that the gauge reading is 0 ~ -50μm.
4) If it is not refer to the following A/C Head Adjustment Procedure.

A/C HEAD TILT ADJUSTMENT

SPEC	A/Amax ≥ 0.95 $V_1/V \geq 0.95$
MODE	Alignment Tape (2) Linear portion, Cue 15KHz Portion
TEST	TP20 (CTL pulse) Servo Board, TP11 on Rec Amp Board, CUE OUT (Rear)
ADJUST	HEX screw A

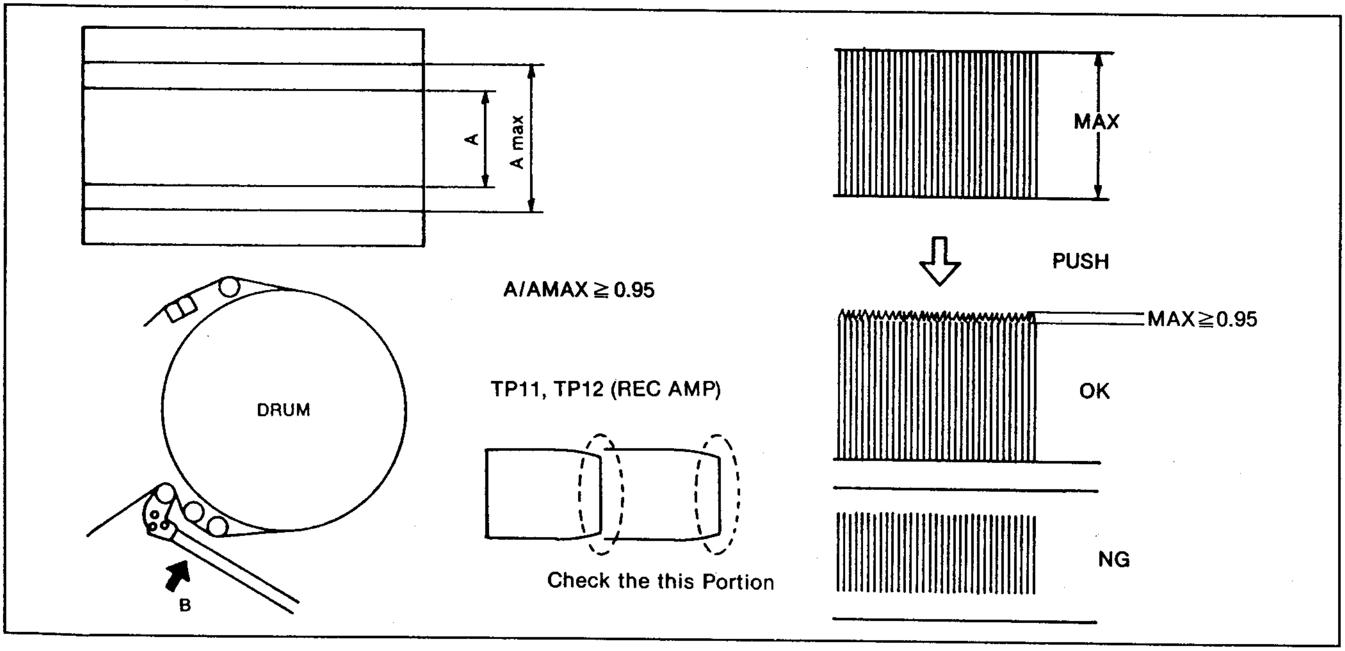
<STEP 1>

1. Playback the alignment tape linear portion and confirm the RF envelope at TP11.
2. Confirm that the RF envelope has no droop or waving on exit side.
3. If doop or waving occur, adjust hex screw A or P6 post height.


D
F
B
J
+
+
E
A
G
C
Just touch
Ⓐ
Ⓑ
Surface
Tape
TP11 (REC AMP)
Check the this portion
Amax
A
Audio
Video
Audio
Audio
Video
Audio

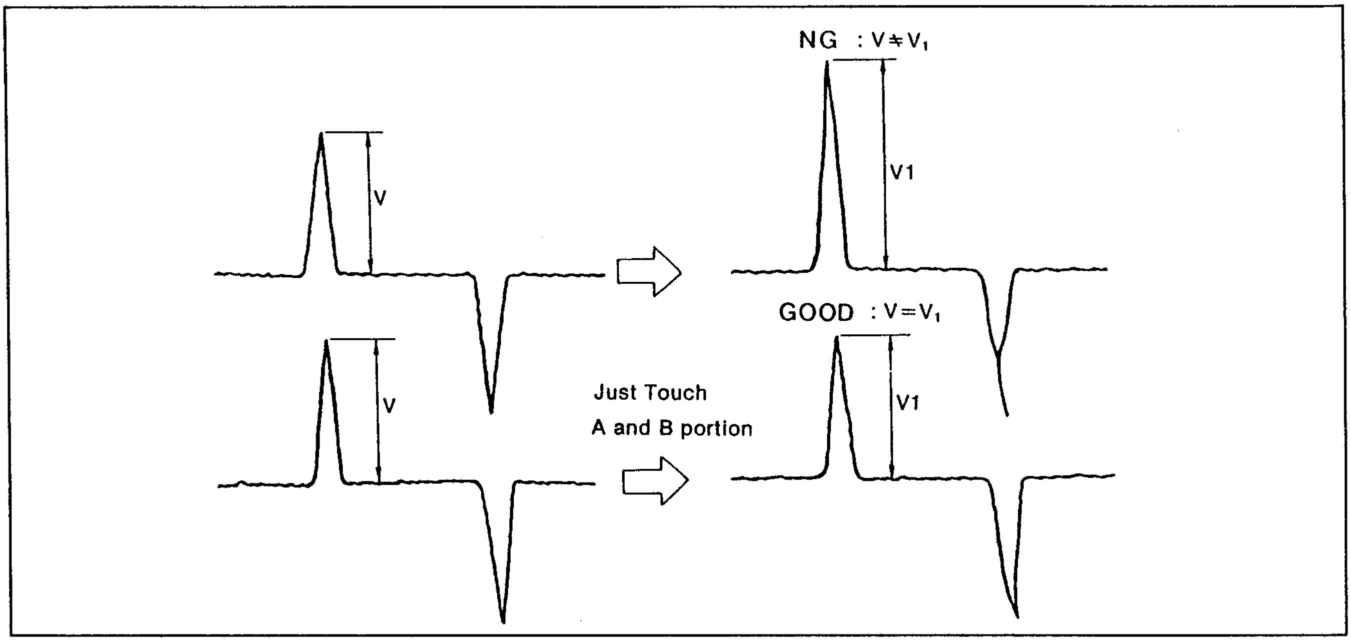
<STEP 2>

1. Playback the cue 15KHz portion and verify the audio level.
2. Tap the supply tension arm and confirm that the audio level and CTL level are maximum.
3. If not, readjust hex screw A.


A
A max
DRUM
B
A/AMAX ≧ 0.95
TP11, TP12 (REC AMP)
Check the this Portion
MAX
PUSH
MAX≧0.95
OK
NG

<STEP 3> Height Confirmation

1. Playback the Linear portion and confirm the CTL level.
2. Gently press the A and B portion of the tape.
3. If CTL level will be increased, loosen the hex screw B and readjust the nut C.

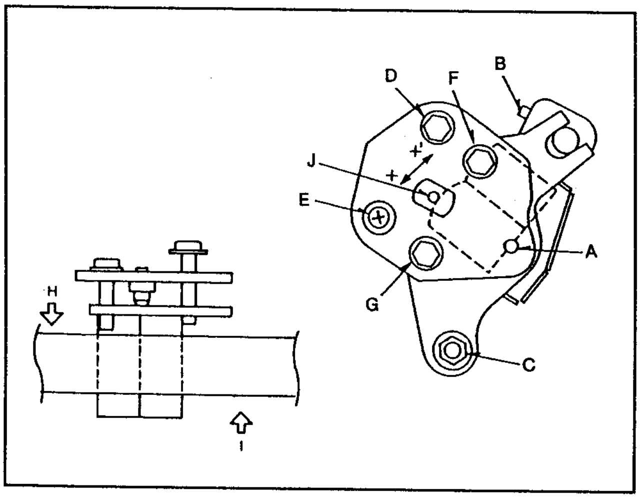

NG : $V \neq V_1$
V
V1
GOOD : $V = V_1$
Just Touch
A and B portion
V
V1

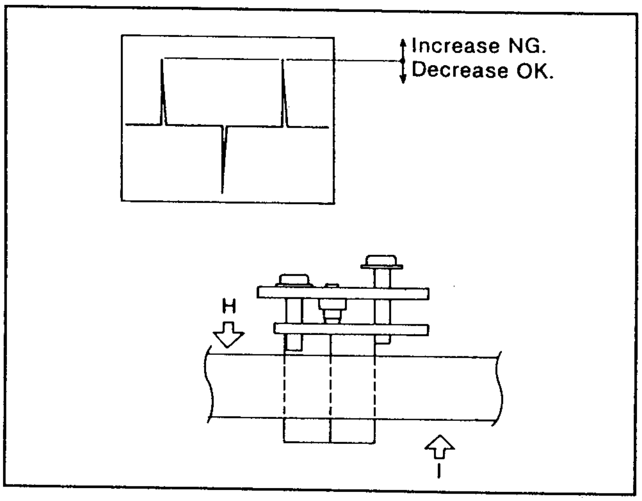
A/C HEAD HEIGHT ADJUSTMENT

SPEC	CTL Output Level is maximum
MODE	Alignment Tape No.2 15KHz Portion
TEST	TP20 on S5 (SERVO) Board
	CUE Audio Output
CONFIRM	Press tape H and I direction and confirm the audio level is decreased
TOOL	HEX Wrench M3, NUT DRIVER M4
M.EQ	Oscilloscope

<Step 1>

1. Connect scope CH1 : TP20 on S5 (SERVO) Board
   CH2 : Cue Audio Output
2. Loosen screw "B" slightly.
3. Press tape gently "H" and "I" direction.
4. If the CH1 (CTL) level increase "H" direction, rotate screw "C" counterclockwise.
5. If the CH1 (CTL) level increase "I" direction, rotate screw "C" clockwise.
6. Confirm the CUE Audio level using same procedure of CTL level.
7. Tighten screw "B".



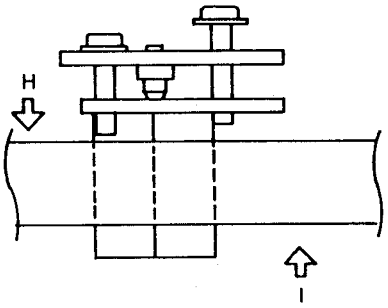


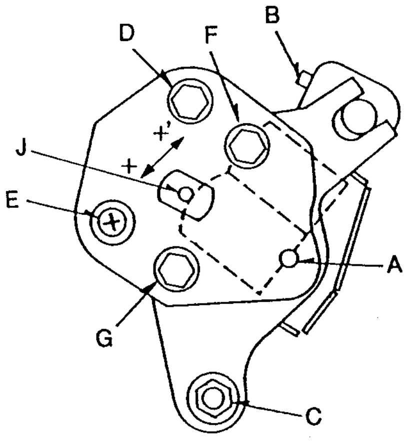
A/C HEAD AZIMUTH ADJUSTMENT

SPEC	Cue Audio Output is maximum
MODE	Alignment Tape No.2 15KHz Portion
TEST	Cue Audio Output
ADJUST	SCREW "D", SCREW "E"

<STEP 1>

1. Connect scope to Cue audio output.
2. Loosen Screw "E" about 1/4 turn ccw.
3. Playback the Alignment tape No.2 15KHz portion.
4. Adjust the screw "D" so that the Cue audio level is maximum.
5. Tighten the 2 screws "E" and "D" alternately keeping the cue audio level is maximum and finally tighten up the screw "E" to 4Kg by using the torque driver.



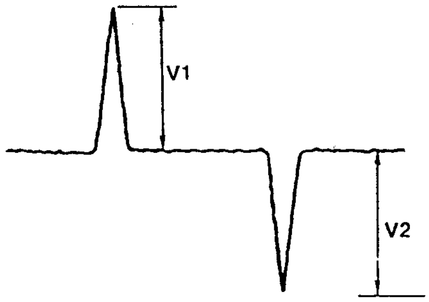


CTL OUTPUT CONFIRMATION

SPEC	$V_1 \geq 5$ [V] $V_2 \geq 5$ [V]
MODE	Alignment Tape (2) Linear portion, Cue 15KHz Portion
TEST	TP20 (CTL pulse) Servo Board

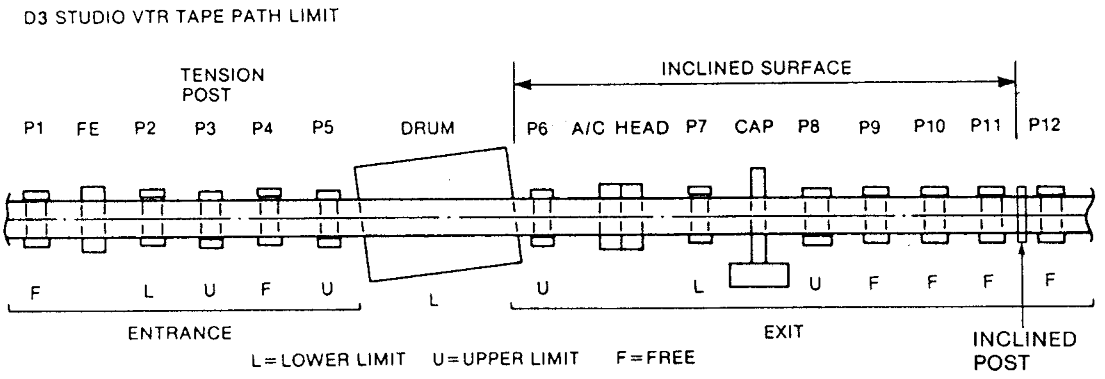
<STEP 1>

1. Confirm the CTL pulse level is more than 5V.
2. If it is not, readjust A/C Head Tilt, Height and Azimuth.



TAPE TRANSPORT POSTS LIMIT POSITION TABLE

Name	Limit	Adjustment
P1 Post	Free	Set Free Position (Torque 2.5kg)
P2 Post	Lower Limit	Lower Limit or Free during PLAY mode (Torque 2.5Kg)
P3 Post	Upper Limit	Confirm the Entrance side Envelope is flat (Torque 2.5Kg)
P4 Post	Free	Set the flange 1/2 CW from lower limit (Torque 2.5Kg)
P5 Post	Upper Limit	Upper Limit during PLAY mode (Torque 2.5Kg)
P6 Post	Upper Limit	Confirm EXIT side Envelope is flat (Torque 2.5Kg)
P7 Post	Lower Limit	Lower Limit during PLAY mode (Torque 2.5Kg)
P8 Post	Upper Limit	Upper Limit during ALL mode (Torque 2.5Kg)
P9 Post	Free	Free in PLAY, REV mode --- Lower Limit (Torque 2.5Kg)
P10 Post	Free	Free or Lower Limit during PLAY and REV (Torque 2.5Kg)
P11 Post	Free	Free or Lower Limit during PLAY and REV (Torque 2.5Kg)
P12 Post	Free	Set Free Position (Torque 2.5Kg)


D3 STUDIO VTR TAPE PATH LIMIT
TENSION POST
INCLINED SURFACE
P1
FE
P2
P3
P4
P5
DRUM
P6
A/C HEAD
P7
CAP
P8
P9
P10
P11
P12
F
L
U
F
U
L
U
L
U
F
F
F
F
ENTRANCE
EXIT
INCLINED POST
L=LOWER LIMIT
U=UPPER LIMIT
F=FREE

Tape Transport

TAPE TRANSPORT CONFIRMATION

<STEP 1>

1. Play back the work tape.
2. Confirm the all post limit as shown above and confirm that there is no tape damage at each posts during playback.

<STEP 2>

1. Confirm that the P8 post is upper limit during playback.
2. Set the VTR VAR × -1 mode.
3. Confirm that there is no tape damage at P7 lower flange portion.
4. If there is the tape damage, adjust the P9 flange so that the tape damage at P7 post lower flange portion does not occur.
5. Confirm that there is no tape damage at P9 post flange portion.

<STEP 3>

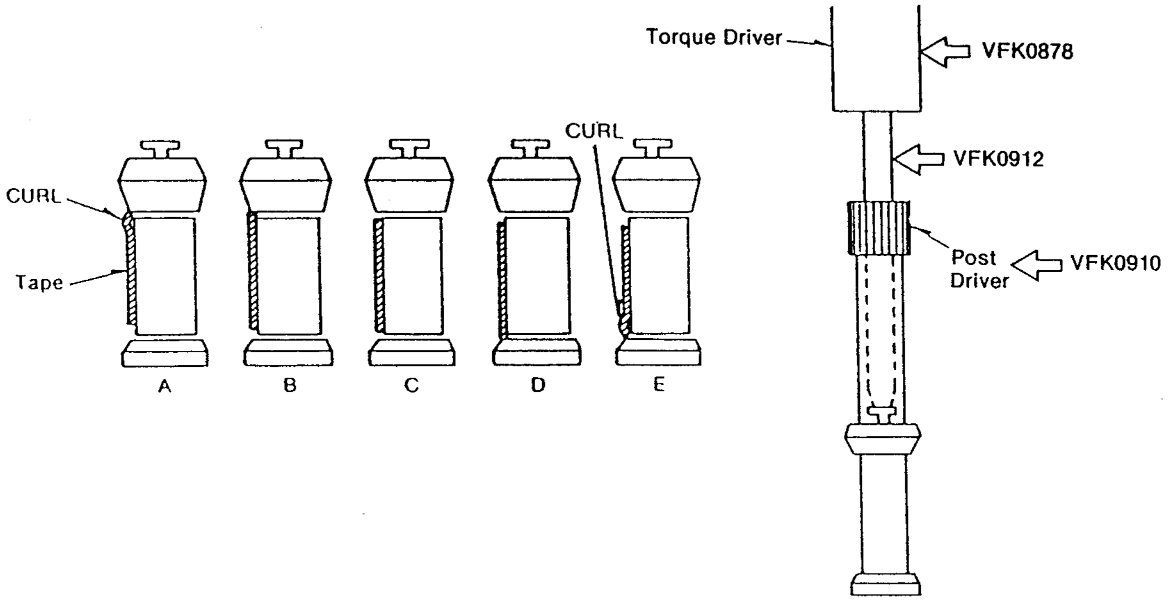
1. Set the VTR VAR × -1 ~ VAR × 3 alternately.
2. Confirm that there is no tape damage at P9, P10, P11 lower flange portion.
3. If there is the tape damage, adjust P10, P11 post flange so that the tape damage at P9, P10, P11 does not occur.

P7, P8, P9, P10 AND P11 POST HEIGHT ADJUSTMENT

	LIMIT (PLAY mode)	TAPE HEIGHT					ADJUSTMENT
		A	B	C	D	E	
P7 POST	Lower Limit				O		Just press lower limit without Tape curl.
P8 POST	Upper Limit		O				Just touch upper flange.
P9 POST	Free (or Upper Limit or Lower Limit)		O	O	O		Set SHTL ×-1. Adjust P9 post so that the tape curl does not appear at P7 lower flange.
P10,P11 POST	Free (or Upper Limit or Lower Limit)		O	O	O		Alternately set SHTL ×3 and ×-1, adjust P10 and P11 so that the tape curl will not appear P9, P10, P11 posts.

TAPE	Self Recording Tape
MODE	Play, SHTL mode
TOOL	POST DRIVER, CHECK MIRROR

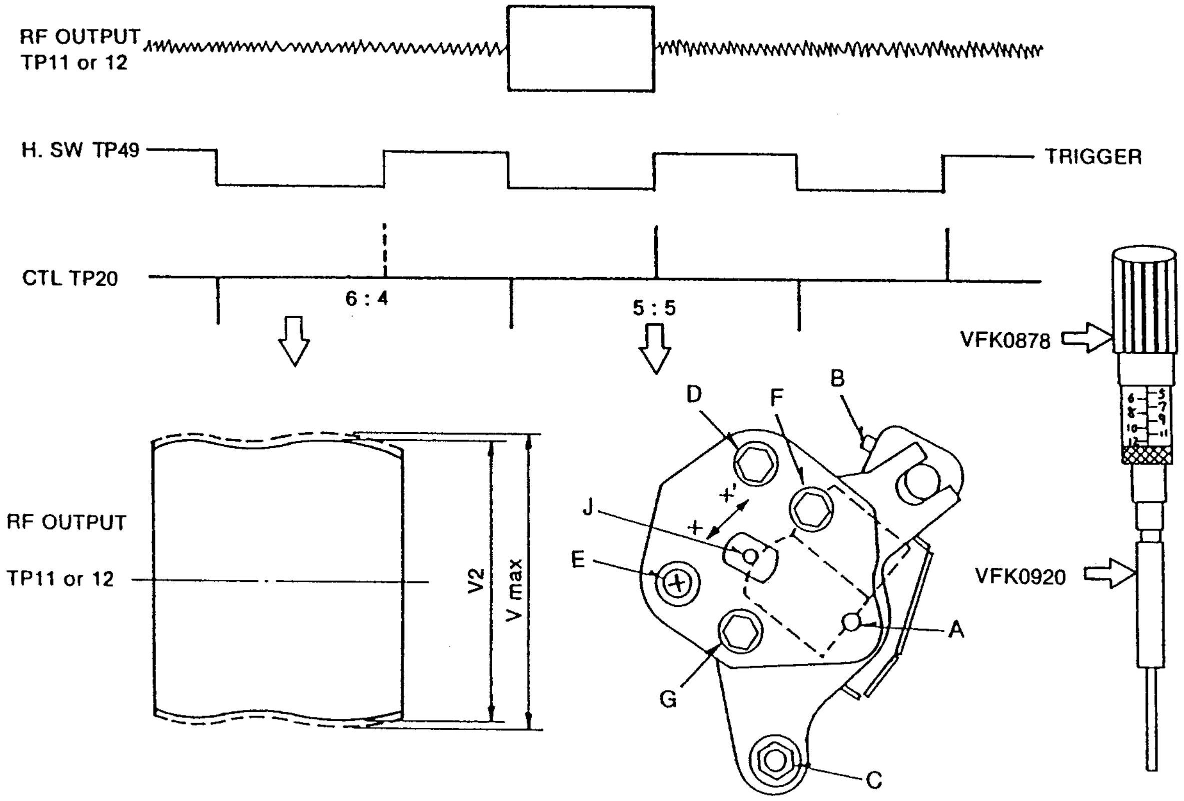
* When tighten the each posts, torque value is 2.5Kg by using the torque driver.


CURL
Tape
CURL
A
B
C
D
E
Torque Driver
VFK0878
VFK0912
Post Driver
VFK0910

A/C HEAD HORIZONTAL POSITION COARSE ADJUSTMENT

SPEC	RF Envelope, Head SW and CTL relationship is shown in Fig.
	V2/Vmax ≥ 0.95
TAPE	A/C Head Horizontal Position Master Tape
	Alignment No.2 Linear Portion
MODE	PLAY mode, Tracking VR Fix
TEST	REC AMP TP11 or TP12 (RF)
	S5 SERVO TP20 (CTL) [H1], TP49 (HEAD SW)
ADJ.	A/C Head Screw "F" and "G" (Torque 5Kg), Hole "J"
TOOL	Eccentric Driver (ø2) VFK0358, VFK0878 and VFK0920

* Set the variable torque driver (VFK0878) to 5Kg and tighten 2 screws (F) and (G).


RF OUTPUT
TP11 or 12
H. SW TP49
TRIGGER
CTL TP20
6 : 4
5 : 5
VFK0878
VFK0920
D
F
B
J
+'
+
E
A
G
C
RF OUTPUT
TP11 or 12
V2
V max

PG SHIFTER ADJUSTMENT (S5:SERVO)

SPEC	PAL:25.5±0.5μsec, NTSC:27.0±0.5μsec
TEST	TP11 (REC AMP) TP37 (SERVO)
MODE	PLAY
TAPE	75% COLOR BAR PORTION ALIGNMENT TAPE
M.EQ	OSCILLOSCOPE
INPUT	
ADJ.	SW2[F2], SW3

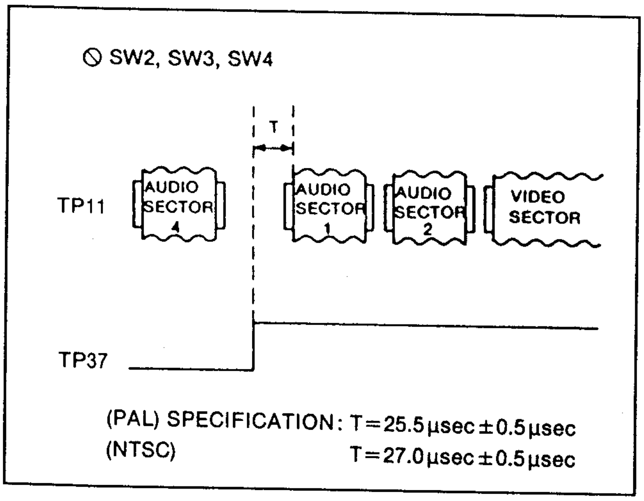
<STEP 1>
MENU CONDITION

TEST MENU

Select the TRACKING FIX/VAR F10 to "FIX".

<STEP 2>

1. SCOPE CH1 : TP11 (REC AMP)
   SCOPE CH2 : TP37 (SERVO)
2. SCOPE TRIGGER : CH2
3. Adjust SW2, 3 and 4 so that the period T is as shown in Figure.


⦸ SW2, SW3, SW4
T
TP11
AUDIO SECTOR 4
AUDIO SECTOR 1
AUDIO SECTOR 2
VIDEO SECTOR
TP37

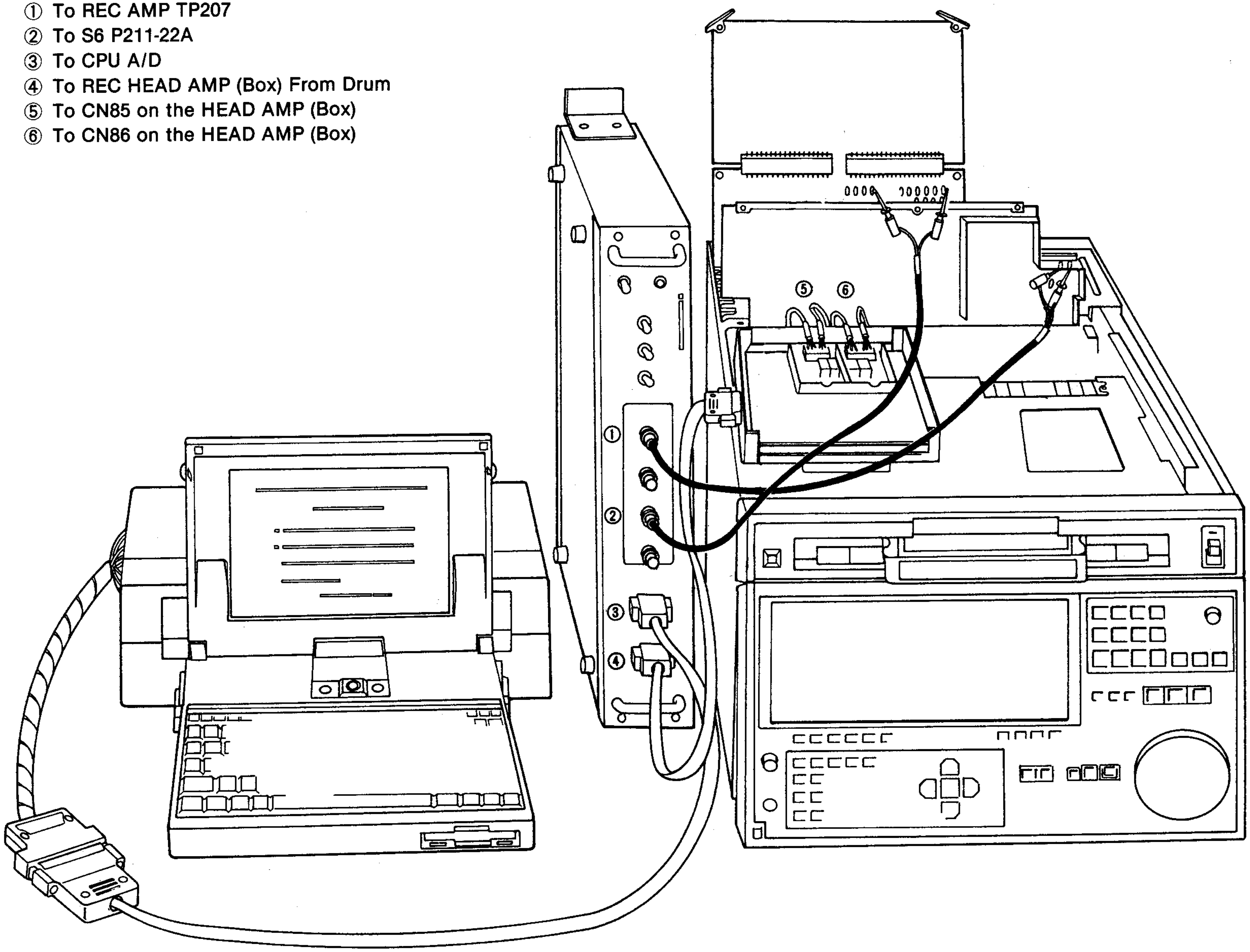
(PAL) SPECIFICATION: T=25.5μsec±0.5μsec
(NTSC) T=27.0μsec±0.5μsec

SW2: Fine adjustment
SW3: Pre fine adjustment
SW4: Coarse adjustment

HEAD ADJUSTMENT TOOL CABLE CONNECTION WITH AJ-D350

(Software Ver. 6.2)

① To REC AMP TP207
② To S6 P211-22A
③ To CPU A/D
④ To REC HEAD AMP (Box) From Drum
⑤ To CN85 on the HEAD AMP (Box)
⑥ To CN86 on the HEAD AMP (Box)



D3 Linearity/Head Height Adjustment Tool with Software Ver.6.2

The Linearity/Head Height Adjustment Tool is used to adjust the D3, D5 VTR tape straightness linearity, recording head height and flying erase head height adjustment.
The function of the linearity and head height adjustment is changed by a manual switch on the tool and recording head height and flying erase head adjustment is automatically selected by a computer.
This tool power supply circuit is selectable 100 to 120 V or 220 to 240 V. This tool also can use for NTSC and PAL MODEL adjustment by selecting a manual switch.
For this adjustment A/D converter and IBM PC AT is necessary, they are also selectable by a manual switch.

SECTION 1 SETUP

1. CONTENTS OF TOOL SET

This tool is supplied as following set.
Please confirm all the items are packed completely.

1. Main unit
2. Head amplifier board unit
3. Head amplifier connection cable
4. A/D converter connection cable
5. A/C power cable
6. 4 BNC-PIN cables
7. Adaptor cable for AJ-D340.

*Software in 3.5" floppy disk will be sent separately.

FILE CONSTRUCTION

(1) File required to start
Either E.Q.N is put into □
E:For PC-AT ELMEC A/D
Q:For PC-AT QUATECH A/D
N:For PC-98

1) Programm File

*□62MENU	.EXE	Selection MENU
*□62LIN	.EXE	Linearity Measurement (AJ-D350/D320/D340/D580)
*□62RECD3	.EXE	REC Head Height Measurement (AJ-D350/D310/D320/D340)
*□62RECD5	.EXE	REC Head Height Measurement (AJ-D580)
*□62FE	.EXE	FE Head Height Measurement (AJ-D350/D580)

2) Data File

*□62MODE .DAT	Each programm start assistance (Measurement Mode/Model Distinguish)
*□62TAPE2 .DAT	No.2 Alignment Tape Data
*□62TAPE3 .DAT	No.3 Alignment Tape Data
*□62TAPE4 .DAT	D5 Head Height Measurement Tape Data

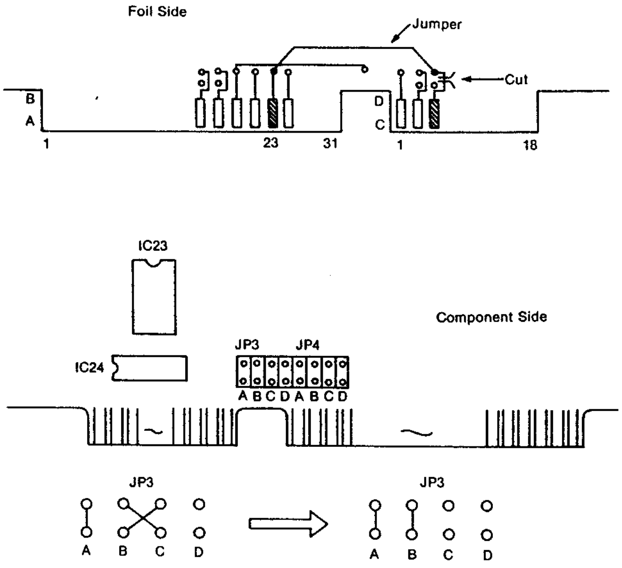
3) Instruction File

*□62D350	.IST	Connection and Setting Instruction for AJ-D350
*□62D310	.IST	Connection and Setting Instruction for AJ-D310/320
*□62D340	.IST	Connection and Setting Instruction for AJ-D340
*□62D580	.IST	Connection and Setting Instruction for AJ--D580

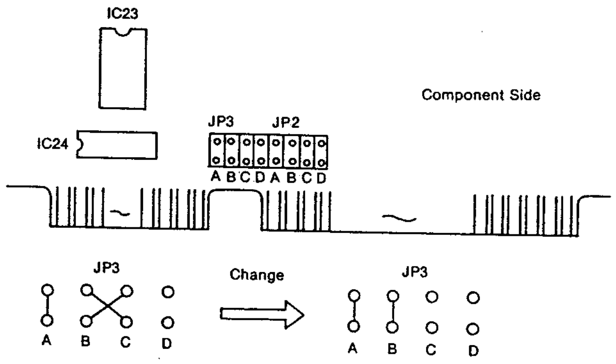
When use the ELMEC A/D Board ...
Please confirm the IRQ port assignment of your personnel computer before intall the software. IRQ 10 to be used for this tool so if IRQ 10 of your PC is already used, A/D board modification and config. sys file change will be needed.

⟨IRQ port modification method⟩

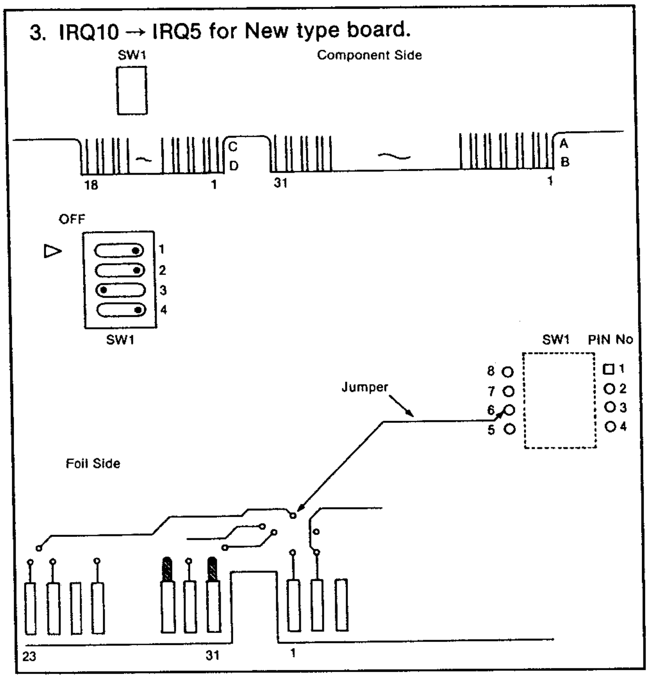
1. IRQ10 → IRQ5 for Old type board.



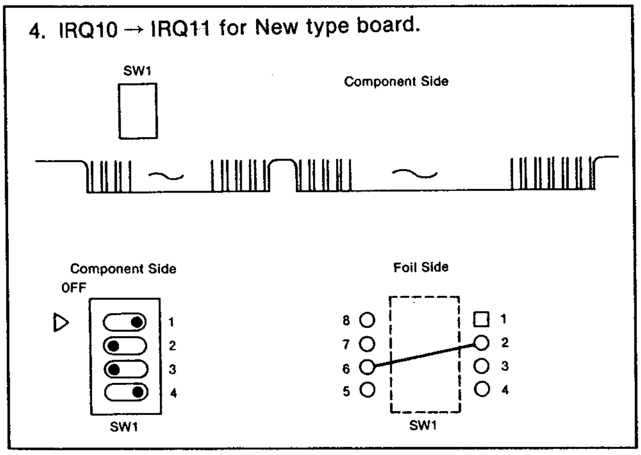
2. IRQ10 → IRQ11 for Old type board.



3. IRQ10 → IRQ5 for New type board.



4. IRQ10 → IRQ11 for New type board.



Personal computer setup (ELMEC A/D Board Only)

(1) Insert the 3.5" floppy disk into drive A of the computer and confirm the ADCDRV. SYS, ADCDRV_M.SYS and ADCDRV_5.SYS are existed.
(2) Copy your computer config. sys as config.org, this is necessary when you want to return original config. sys setup.
(3) Read the config. sys of your computer and add the following sentence.
    DEVICE = ADCDRV. SYS
(4) If IRQ has changed IRQ10 to IRQ11, please change config. sys as follows.
    DEVICE = ADCDRV_M.SYS
(5) If IRQ has changed IRQ10 to IRQ5, please change config. sys as follows.
    DEVICE = ADCDRV_5.SYS
(6) Overwrite your computer config. sys.
(7) Remove the A drive 3.5" floppy disk and press CTRL + ALT + DEL to reset your computer.

2. SETUP and CONNECTION

STEP 1. A/D CONVERTER BOARD

Install the A/D converter to the AT (16bit) slot.

STEP 2. Cable Connection

AT H SW	-(BNC-IC CLIP)→	REC AMP TP207 (D350) S4(Extension Board) P208(LEFT) 24A (D580)
FE HEAD A/B	---------------→	Not required (D350, D580)
CUE REC L	-(BNC-IC CLIP)→	S6(Extension Board) P211((RIGHT)22A(D350)
	-(BNC-50P CABLE)→	Parallel I/O(50P)(D580)
FRAME PULSE	-----------------→	Not required (D350,D580)
OUTPUT	-(15P Long) ---→	A/D Board (D350,D580)
REC HEAD	-(15P Short) --→	Head Amp(BOX) (D350,D580)

STEP 3. MAIN UNIT SWITCH EXPLANATION

Front Panel Switch

(1) Power Switch On/Off
(2) Linearity / Head height adjustment select switch
(3) AT HSW -- A/D converter trigger NORMAL/INVERT select switch.
(4) NEC PC-9801/IBM PC AT computer select switch.

STEP 4. RS-232C Cable

9pin - 25pin RS-232C cross cable is necessary to connect the AJ-D350/D580 and your computer.
This cable is not included this set, so please purchase locally.

EXAMPLE OF THE CABLE

D-SUB 9 PIN VTR	D-SUB 25 PIN COMPUTER
HOOD	HOOD, 1
1	4, 5
2	2
3	3
4	6
5	7
6	20
7,8	8

STEP 5. HEAD AMPLIFIER UNIT CONNECTION

1) Head Amp Box

Drum Connector (Green)
→ HEAD AMP(BOX) CN85(Green)
Drum Connector (Red)
→ HEAD AMP(BOX) CN86(Brown)

(D350)
Head Amp (BOX) Connector (Green)
→ P504 (Green) VTR Rec Amp
Head Amp (BOX) Connector (Red)
→ P511 (Green) VTR Rec Amp

(D580)
Head Amp (BOX) Connector (Green)
→ P503 (Green) VTR Rec Amp
Head Amp (BOX) Connector (Red)
→ P505 (Red) VTR Rec Amp

STEP 6. RS-232C COMMUNICATION

- Cange of Communication parameter

BAUD RATE : 9600
DATA LENGTH : 7
START BIT : 1
STOP BIT : 1
PARITY : ODD

LINEARITY / HEAD HEIGHT MENU Ver. 6.2 INSTRUCTION

1. SCREEN DISPLAY

```
      D3/D5
         Linearity / Head Height Mesasurement
  ==========================================
                                   QUATECH Ver. 6.2
      - - - - Main Menu - - - - D3/D5 Tool

         [1] AJ-D350           Linearity
         [2] AJ-D350                                  REC Head
         [3] AJ-D350                                  FE Head

         [4] AJ-D310/320     Linearity
         [5] AJ-D310/320     REC Head

         [6] AJ-D340                                  Linearity
         [7] AJ-D340                                  REC Head

         [8] AJ-D580                                  Linearity
         [9] AJ-D580                                  REC Head
         [A] AJ-D580                                  FE Head

         [T] TOOL Selection
         [ESC] QUIT
```

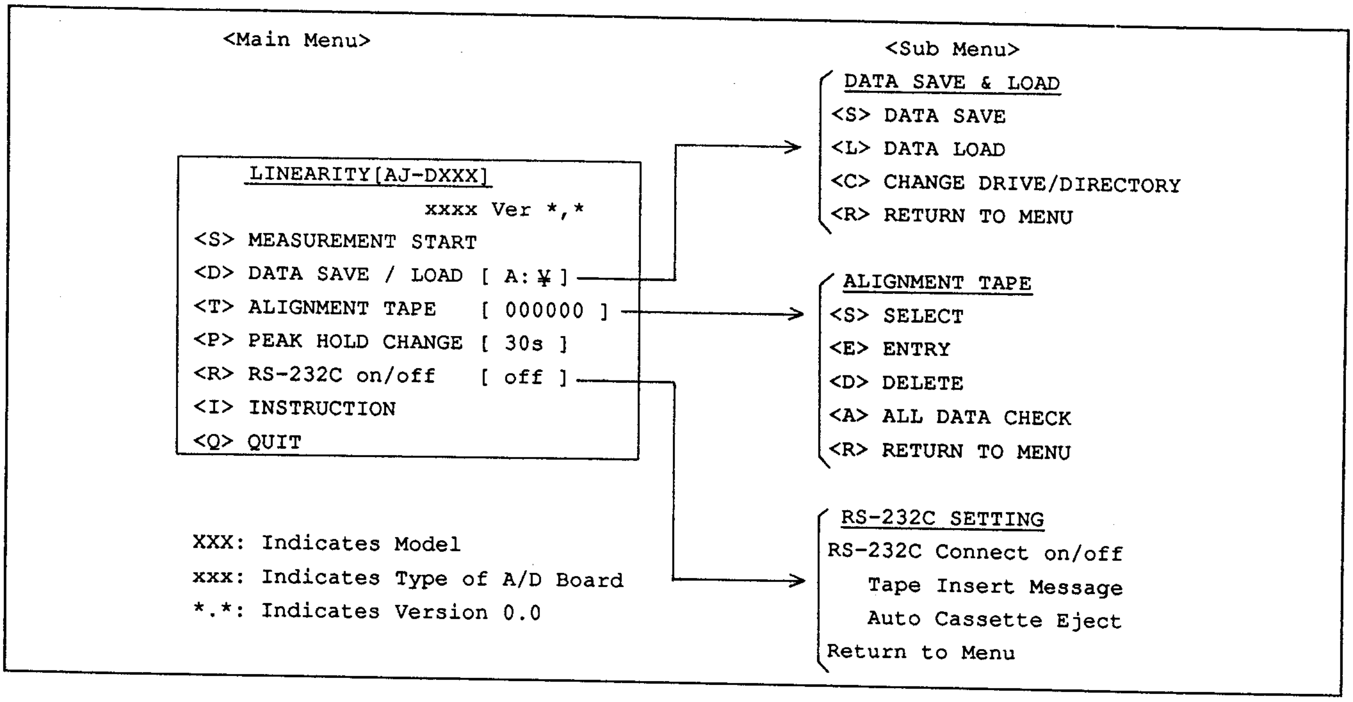
2. Operating Instruction
   (1) Start of each software
      - Select by cursor key, and hit [ENTER] to start.
      - Hit Figure at left side end or alphabet key.

   (2) Setting of Tool Type [T] Tool Selection
      1) Select by cursor key and hit [ENTER] to start.

```
 <TOOL SELECT>     D3 TOOL    D3/D5 TOOL
```

      2) Select D3 or D3/D5 TOOL by [←] [→] key.
      3) Type of setting Tool is indicated on right/upper portion of screen.

LINEARITY Ver. 6.2 OPERATING INSTRUCTIONS



```
<Main Menu>

LINEARITY[AJ-DXXX]
                xxxx Ver *,*
<S> MEASUREMENT START
<D> DATA SAVE / LOAD [ A:¥ ]
<T> ALIGNMENT TAPE   [ 000000 ]
<P> PEAK HOLD CHANGE [ 30s ]
<R> RS-232C on/off   [ off ]
<I> INSTRUCTION
<Q> QUIT

XXX: Indicates Model
xxx: Indicates Type of A/D Board
*.*: Indicates Version 0.0
```

```
<Sub Menu>
DATA SAVE & LOAD
<S> DATA SAVE
<L> DATA LOAD
<C> CHANGE DRIVE/DIRECTORY
<R> RETURN TO MENU

ALIGNMENT TAPE
<S> SELECT
<E> ENTRY
<D> DELETE
<A> ALL DATA CHECK
<R> RETURN TO MENU

RS-232C SETTING
RS-232C Connect on/off
   Tape Insert Message
   Auto Cassette Eject
Return to Menu
```

(2) Explanation of each Function.

2-1. Main Menu

<S> MEASUREMENT START

<D> DATA SAVE . LOAD [A:¥]

→ Sub Menu (2-2) [Indicates drive, directry for data save / load]

<T> ALIGNMENT TAPE [000000]

→ Sub Menu (2-3) [Indicates Serial No. of Alignment Tape to be selected]

<P> PEAK HOLD CHANGE [30s]

Setting of Peak Hold Time [indicates Setting time]

<R> RS-232C on/off [off]

→ Sub Menu (2-4) Connection or no connection of RS-232C cable, Function setting at connection [Indicates existence of cable connection.]

<I> INSTRUCTION

Display the setting and connection procedures Tool and VTR.

<Q> QUIT

Completion of Linearity Alignment

2-2. Sub Menu (DATA SAVE / LOAD)

<S> DATA SAVE

Save of data. Write File Name (No escape command), Comment.

<L> DATA LOAD

Load of data, Write File Name (No escape command).

<C> CHANGE DRIVE / DIRECTRY [A:¥]

Change of drive and directry to save and load the data.

<R> RETURN TO MENU

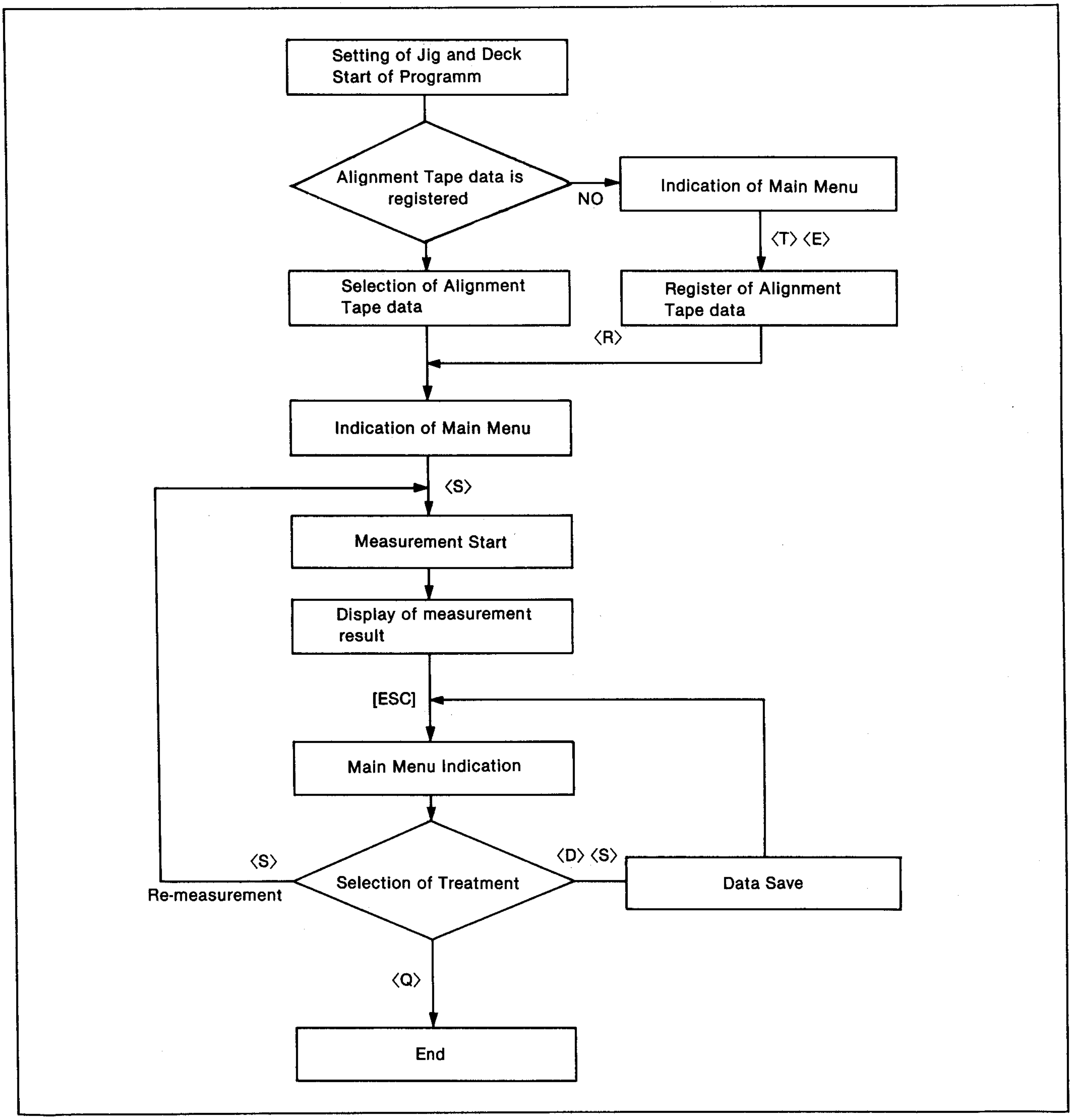
Return to Main Menu.

2-3. Sub Menu (ALIGNMENT TAPE)

<S> SELECT
Selection of Alignment Tape correction data
<E> ENTRY
Input of Alignment Tape correction data
<D> DELETE
Deletion of Alignment Tape correction data

<A> ALL DATA CHECK
Review of Alignment Tape all data
<R> RETURN TO MENU
Return to Main Menu

(3) Flowchart of Linearity Measurement

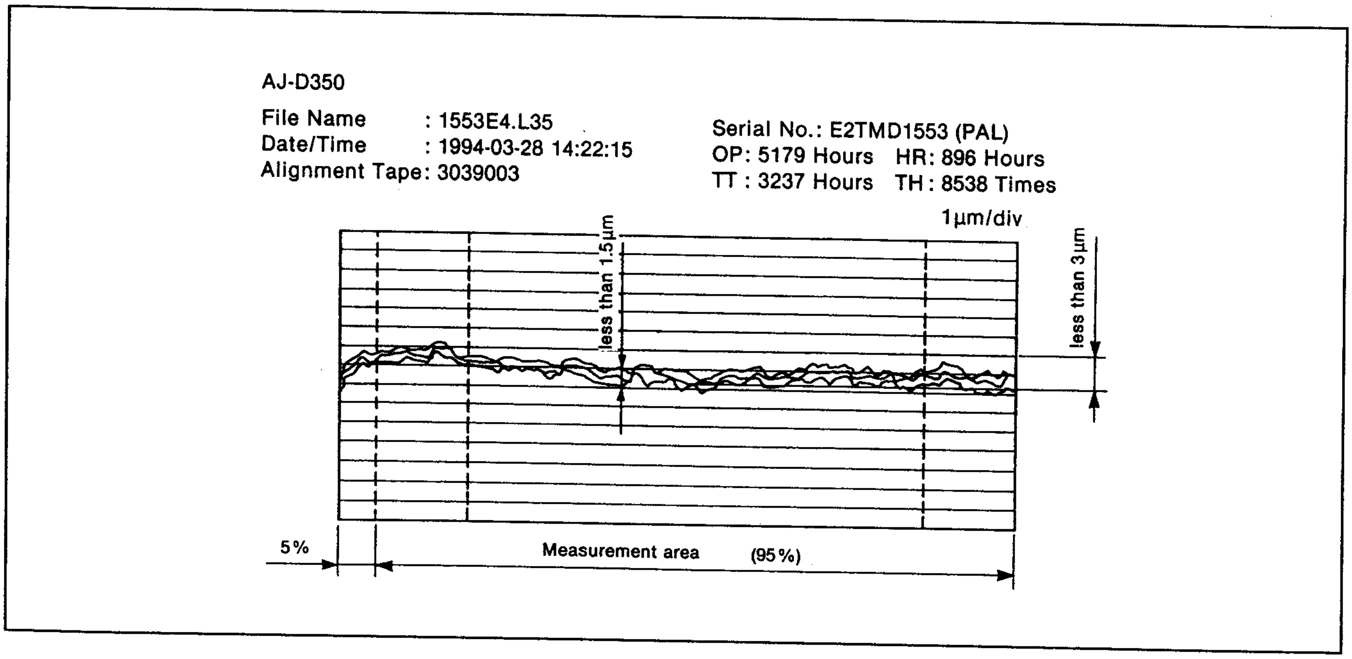

Setting of Jig and Deck
Start of Programm
Alignment Tape data is registered
NO
Indication of Main Menu
〈T〉〈E〉
Selection of Alignment Tape data
Register of Alignment Tape data
〈R〉
Indication of Main Menu
〈S〉
Measurement Start
Display of measurement result
[ESC]
Main Menu Indication
〈S〉
Re-measurement
Selection of Treatment
〈D〉〈S〉
Data Save
〈Q〉
End

LINEARITY ADJUSTMENT

<TOOL CONDITION>
MODE : LINEARITY

1. Select the AJ-D350 LINEARITY menu in the MAIN menu.
2. Select the serial No. of the ALIGNMENT TAPE (No.3). If the alignment tape data is not stored, hit the ENTER key to go to the linearity menu, and input the data in the <T> ALIGNMENT TAPE menu.
3. Play back the Alignment Tape and hit <S> key to start a measurement.
4. The linearity value is less than 3µm and waving value is less than 1.5µm.
5. If necessary, fine adjust P3, P4 and P5 for the entrance side and P6 for the exit side.

```
              LINEARITY [AJ-D350]
==============================================
                          QUATECH Ver. 6.2
                             D3/D5 TOOL
  <S> MEASUREMENT START
  <D> DATA SAVE / LOAD       [C:\]
  <T> ALIGNMENT TAPE         [0000(NTSC)]
  <P> PEAK HOLD CHANGE       [20s]
  <R> RS-232C on/off         [on]
  <I> INSTRUCTION
  <Q> QUIT
```



AJ-D350

File Name : 1553E4.L35
Date/Time : 1994-03-28 14:22:15
Alignment Tape: 3039003

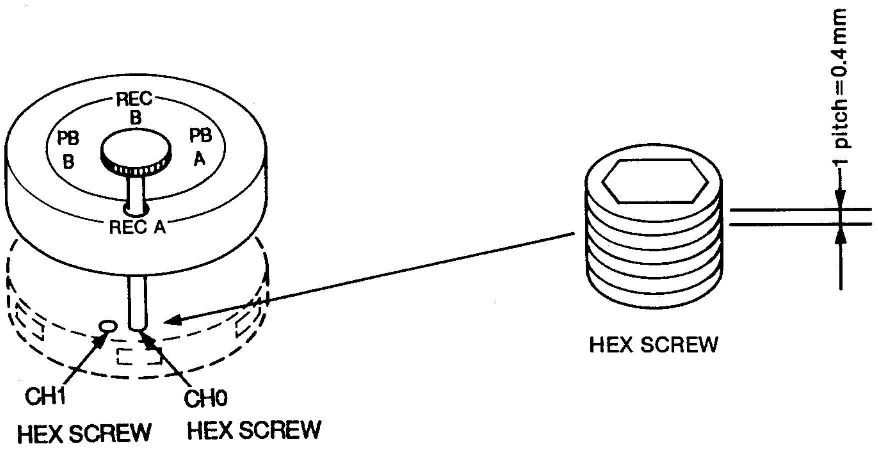
Serial No.: E2TMD1553 (PAL)
OP: 5179 Hours HR: 896 Hours
TT : 3237 Hours TH : 8538 Times

REC HEAD HEIGHT Ver. 6.2 OPERATING INSTRUCTIONS

REC and FE HEAD HEIGHT ADJUSTMENT NOTICE

When adjust the REC or FE HEAD HEIGHT, please note following items.

1. First of all, slightly turn hex screw CCW for release the screw lock.
2. Slightly turn hex screw CW so that the hex screw will be returned original locked position.
3. Then, start to adjust the head height.
4. The pitch of hex screw is 0.4mm so 1 degree is about 1 micron. Please do not turn hex screw more than 20 degrees. If you shift more than 20 degrees you will shift the head position from the video track.



(1) MENU LIST

```
<Main Menu>                                   <Sub Menu>

                                              DATA SAVE & LOAD
                                              <S> DATA SAVE
                                      ->      <L> DATA LOAD
REC HEAD HEIGHT[AJ-DXXX]                      <C> CHANGE DRIVE/DIRECTORY
               xxxx Ver *,*                   <R> RETURN TO MENU
<S> MEASUREMENT START
<D> DATA SAVE / LOAD  [ A:¥ ]                 HEAD WIDTH DATA
<H> HEAD WIDTH DATA   [ 12345 ]       ->      <I> INPUT DATA
<T> ALIGNMENT TAPE    [ 000000 ]              <C> DATA CLEAR
<M> MONITOR                                   <R> RETURN TO MENU
<I> INSTRUCTION
<Q> QUIT                                      ALIGNMENT TAPE
                                              <S> SELECT
                                      ->      <E> ENTRY
XXX: Indicates Model                          <D> DELETE
xxx: Indicates Type of A/D Board              <R> RETURN TO MENU
*.*: Indicates Version 0.0
```

(2) EXPLANATION OF EACH FUNCTION

2-1. Main Menu

<S> MEASUREMENT START

<D> DATA SAVE / LOAD [A:¥]
→ Sub Menu (2-2) [Indicates drive, directry for data save / load]
<H> HEAD WIDTH DATA [12345]
Sub Menu (2-3) [Indicates the Center Drum No. that the head width data has been recorded but indicates "Default" when having no record.]
<T> ALIGNMENT TAPE [000000]
→ Sub Menu (2-4) [Indicates Serial No. of Alignment Tape to be selected]
<M> MONITOR
Indicates the data of A/D conversion.
<I> INSTRUCTION
Display the setting and connection procedures of Tool and VTR.
<Q> QUIT
Completion of Linearity Alignment

2-2. Sub Menu (DATA SAVE / LOAD)

<S> DATA SAVE
Save of data. Write File Name (No escape command), Comment.
<L> DATA LOAD
Load of data. Write File Name (No escape command).
<C> CHANGE DRIVE / DIRECTRY [A:¥]
Change of drive and directry to save and load the data.
<R> RETURN TO MENU
Return to Main Menu.

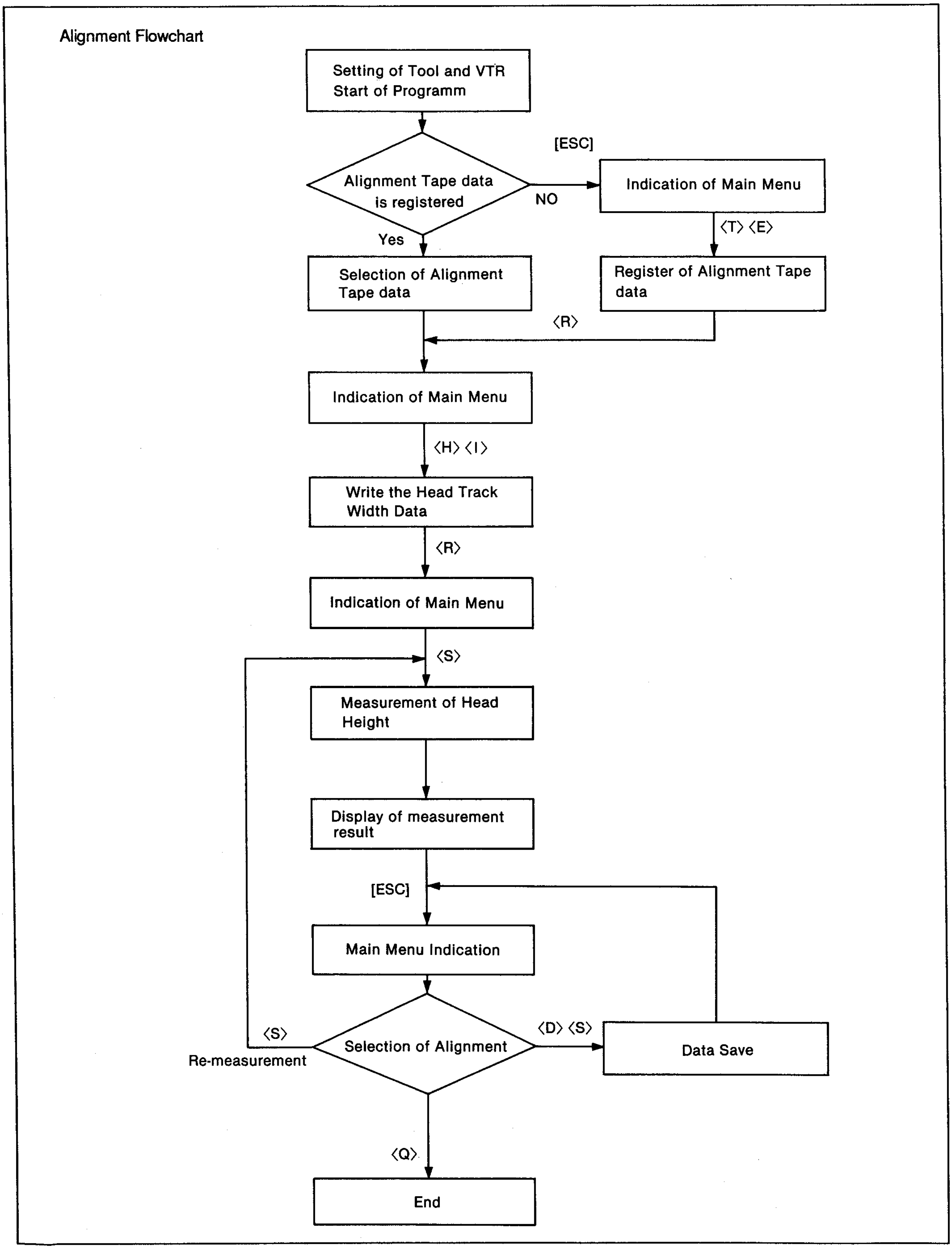
2-3. Sub Menu [HEAD WIDTH DATA]

<I> INPUT DATA
Write the Head Track Width Data, Drum No. of the Center Drum, A ch Data, B ch Data.
<C> DATA CLEAR
Make the Head Track Width Data to the default value.
<R> RETURN TO MENU
Return to Main Menu

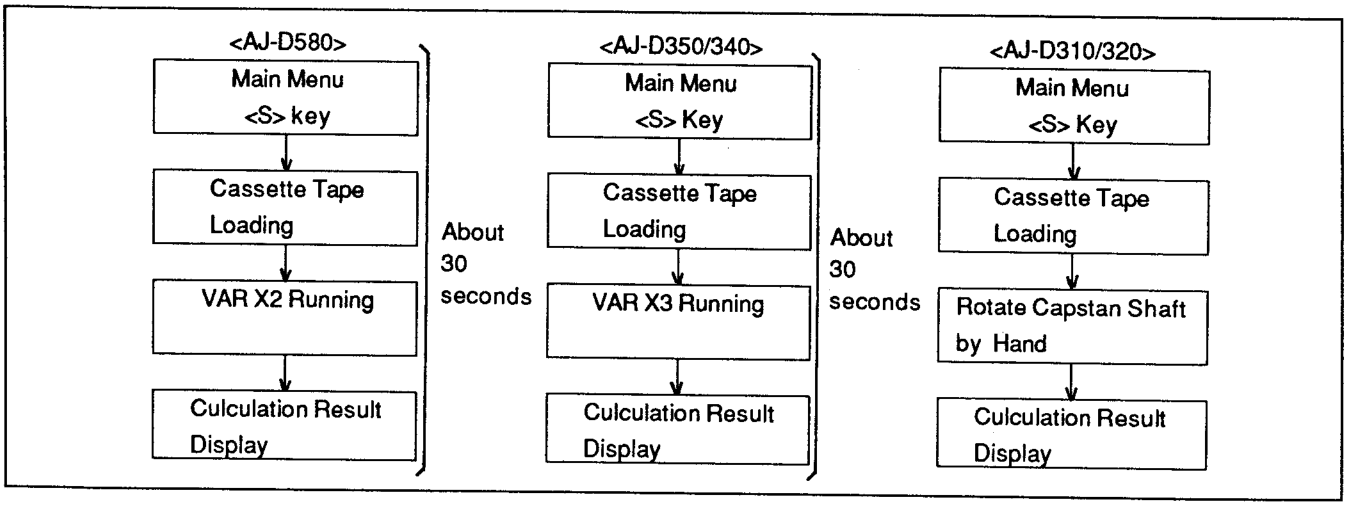
2-4. Sub Menu (ALIGNMENT TAPE)

<S> SELECT
Selection of Alignment Tape correction data
<E> ENTRY
Input of Alignment Tape correction data
<D> DELETE
Deletion of Alignment Tape correction data
<R> RETURN TO MENU
Return to Main Menu

(3) FLOWCHART OF REC HEIGHT MEASUREMENT / ALIGNMENT


Alignment Flowchart
Setting of Tool and VTR
Start of Programm
Alignment Tape data
is registered
[ESC]
NO
Indication of Main Menu
〈T〉〈E〉
Register of Alignment Tape data
Yes
Selection of Alignment Tape data
〈R〉
Indication of Main Menu
〈H〉〈I〉
Write the Head Track Width Data
〈R〉
Indication of Main Menu
〈S〉
Measurement of Head Height
Display of measurement result
[ESC]
Main Menu Indication
〈S〉
Re-measurement
Selection of Alignment
〈D〉〈S〉
Data Save
〈Q〉
End

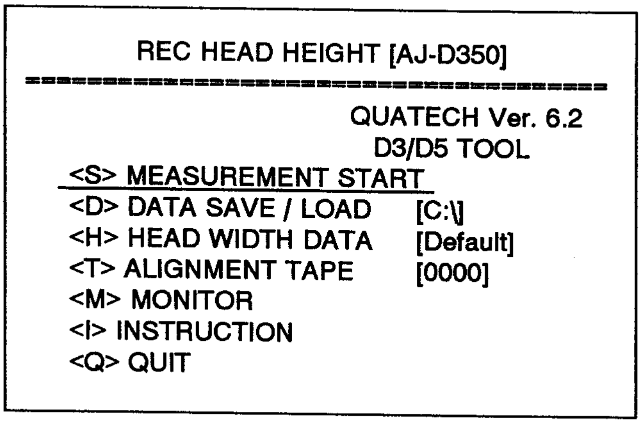
MEASUREMENT FLOWCHART


<AJ-D580>
Main Menu <S> key
Cassette Tape Loading
VAR X2 Running
Culculation Result Display
About 30 seconds
<AJ-D350/340>
Main Menu <S> Key
Cassette Tape Loading
VAR X3 Running
Culculation Result Display
About 30 seconds
<AJ-D310/320>
Main Menu <S> Key
Cassette Tape Loading
Rotate Capstan Shaft by Hand
Culculation Result Display

REC HEAD HEIGHT ADJUSTMENT

<TOOL CONDITION>
MODE : HEAD HEIGHT

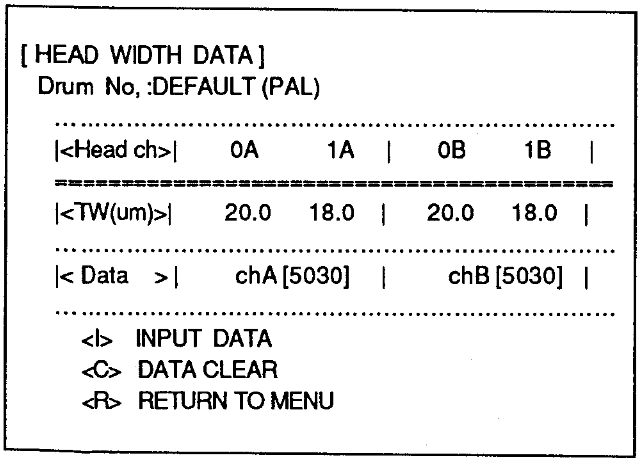
1. Select the AJ-D350 REC HEAD menu in the MAIN menu.
2. Select the serial No. of the ALIGNMENT TAPE (No.2 color bar). If the alignment tape data is not stored, hit the ENTER key to go to the REC HEAD menu, and input the data in the <T> ALIGNMENT TAPE menu.
3. Select the <H> HEAD WIDTH DATA in the REC HEAD menu, and input the number written on the center drum. If that number is not input, the default data can be used.



```
         REC HEAD HEIGHT [AJ-D350]
=========================================
                      QUATECH Ver. 6.2
                         D3/D5 TOOL
 <S> MEASUREMENT START
 <D> DATA SAVE / LOAD     [C:\]
 <H> HEAD WIDTH DATA      [Default]
 <T> ALIGNMENT TAPE       [0000]
 <M> MONITOR
 <I> INSTRUCTION
 <Q> QUIT
```

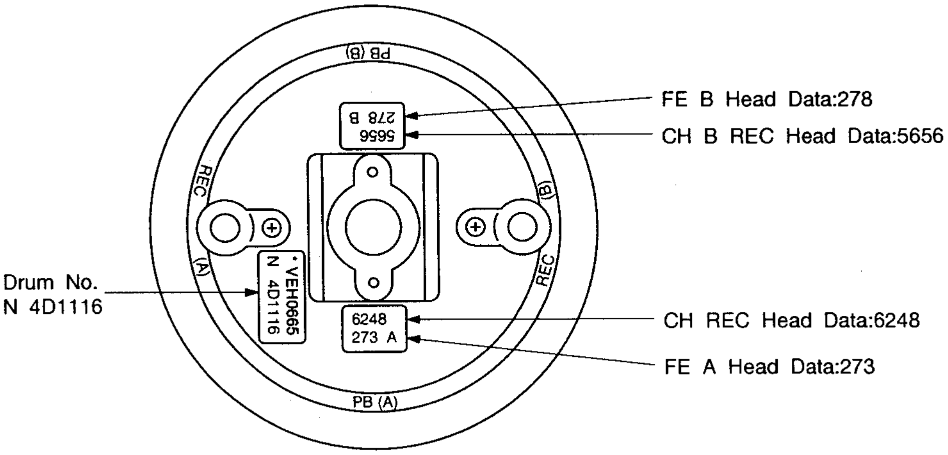
HEAD WIDTH DATA INPUT PROCEDURE

3-1. Select <H> key so that the following display is indicated.



```
[ HEAD WIDTH DATA ]
 Drum No, :DEFAULT (PAL)
 ..........................................
  |<Head ch>|   0A    1A  |  0B    1B  |
 ==========================================
  |<TW(um)>|   20.0  18.0 | 20.0  18.0 |
 ..........................................
  |< Data  >|   chA [5030] |  chB [5030] |
 ..........................................
    <I>  INPUT DATA
    <C>  DATA CLEAR
    <R>  RETURN TO MENU
```

3-2. Select [I] key (INPUT DATA) and input the Head width Data which is adhered on the center drum as follows. (Center Drum with Head Width Data has been introduced on Jan. '95.)


PB (B)
278 B
5656
REC
(A)
(B)
REC
• VEH0665
N 4D1116
6248
273 A
PB (A)
FE B Head Data:278
CH B REC Head Data:5656
Drum No.
N 4D1116
CH REC Head Data:6248
FE A Head Data:273

```
Drum No.        ?                                 ←          N4D1116
chA Head Data   ?                                 ←          6248
chB Head Data   ?                                 ←          5656
     ok ? (y/n)
```

After input the Drum No. and Head Data, enter "Y" key so that the data is displayed as follows.

```
                    [ HEAD WIDTH DATA ]
                     Drum No. : N4D1116
-------------------------------------------------------------
           <Head ch>  0A    1A    0B    1B
=============================================================
           <TW(um)>   20.3  18.6  20.0  17.9
-------------------------------------------------------------
           <Data>     chA [6248]  chB [5656]
-------------------------------------------------------------
```

3-3. Enter [R] key to return to main menu.

4. Set the CONTROL mode in the VTR to REMOTE.
5. Hit <S> key and insert the Alignment tape (No.2 color bar).
6. The specification is 0 ± 1µm. If necessary, adjust each head height except ch 1A.
   * Don't touch the 1A head because it is the reference head.
7. After the adjust, make 3 times of measurement to confirm.

* During Head Height adjustment (REC and FE) important notice is indicated on the display as follows.

IMPOTANT NOTICE:

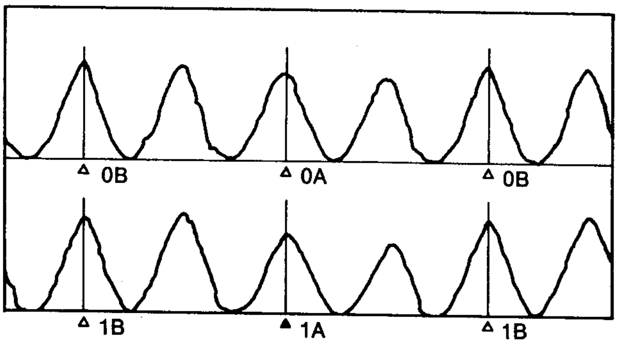
Too much downward adjustment of the head height screws may damage the head base. To protect this over adjustment, the following procedures are necessary.

1) Rotate each adjustment screw COUNTERCLOCKWISE (↺) slightly to make the adjustment screw free from GLUE.
2) Then adjust the screw according to the computer display result.

《AJ-D350》

AJ-D350

File Name : 1553E4.R35 Serial No.: E2TMD1553 (PAL)
Date/Time : 1994-03-28 14:36:21 OP: 5179 Hours HR: 896 Hours
Alignment Tape : 9039080 TT : 3237 Hours TH : 8541 Times
Head Width Data: Default



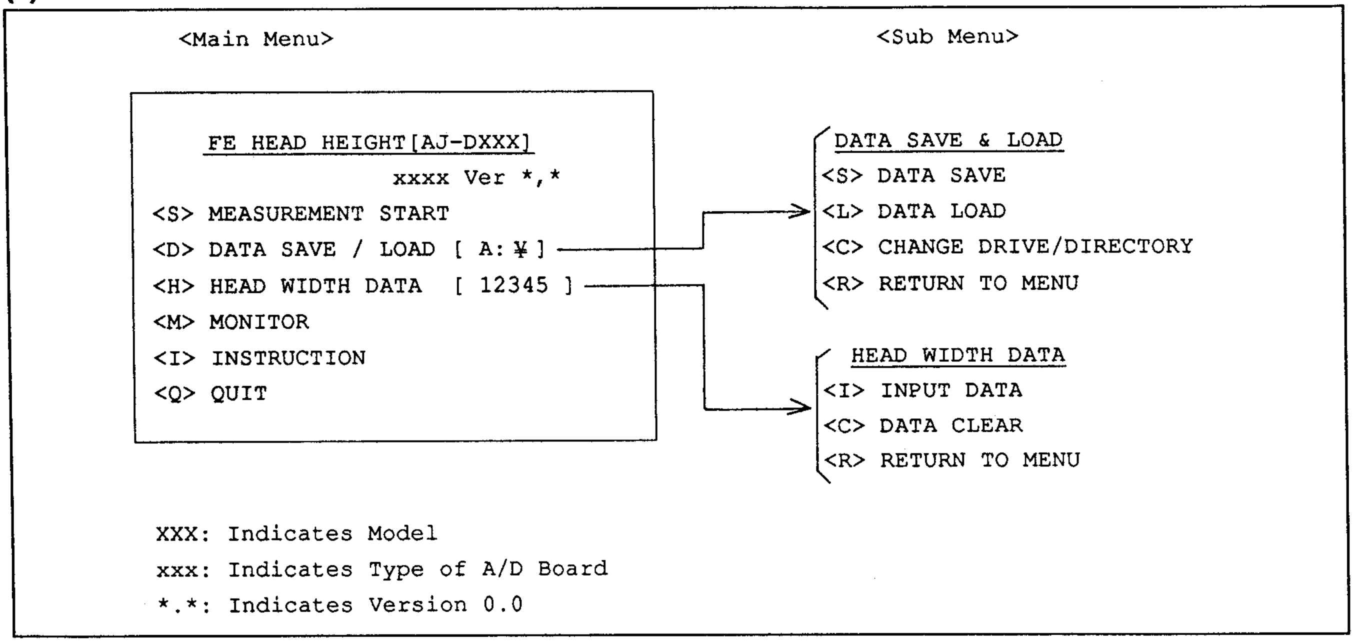
0A −0.7μm
0B −0.3μm

1B 0.4μm

▲ mark means Ref. Head

FE HEAD HEIGHT Ver. 6.2 OPERATING INSTRUCTIONS

(1) MENU LIST



```
<Main Menu>

FE HEAD HEIGHT[AJ-DXXX]
              xxxx Ver *,*
<S> MEASUREMENT START
<D> DATA SAVE / LOAD [ A:¥ ]
<H> HEAD WIDTH DATA  [ 12345 ]
<M> MONITOR
<I> INSTRUCTION
<Q> QUIT

<Sub Menu>

DATA SAVE & LOAD
<S> DATA SAVE
<L> DATA LOAD
<C> CHANGE DRIVE/DIRECTORY
<R> RETURN TO MENU

 HEAD WIDTH DATA
<I> INPUT DATA
<C> DATA CLEAR
<R> RETURN TO MENU

XXX: Indicates Model
xxx: Indicates Type of A/D Board
*.*: Indicates Version 0.0
```

(2) EXPLANATION OF EACH FUNCTION

2-1. Main Menu

<S> MEASUREMENT START

<D> DATA SAVE / LOAD [A:¥]

Sub Menu (2-2) [Indicates drive, directry for data save / load]

<H> HEAD WIDTH DATA [12345]

Sub Menu (2-3) [Indicates the Center Drum No. that the head width data has been recorded but indicates "Default" when having no record.]

<M> MONITOR

Indicates the data of A/D conversion.

<I> INSTRUCTION

Display the setting and connection procedures of Tool and VTR.

<Q> QUIT

Completion of FE HEAD HEIGHT Alignment

2-2. Sub Menu (DATA SAVE / LOAD)

<S> DATA SAVE

Save of data. Write File Name (No escape command), Comment.

<L> DATA LOAD

Load of data. Write File Name (No escape command).

<C> CHANGE DRIVE / DIRECTRY [A:¥]

Change of drive and directry to save and load the data.

<R> RETURN TO MENU

Return to Main Menu.

2-3. Sub menu (HEAD WIDTH DATA)

<I> INPUT DATA

Write the Head Track Width Data, Drum No. of the Center Drum, A ch Data, B ch Data.

<C> DATA CLEAR

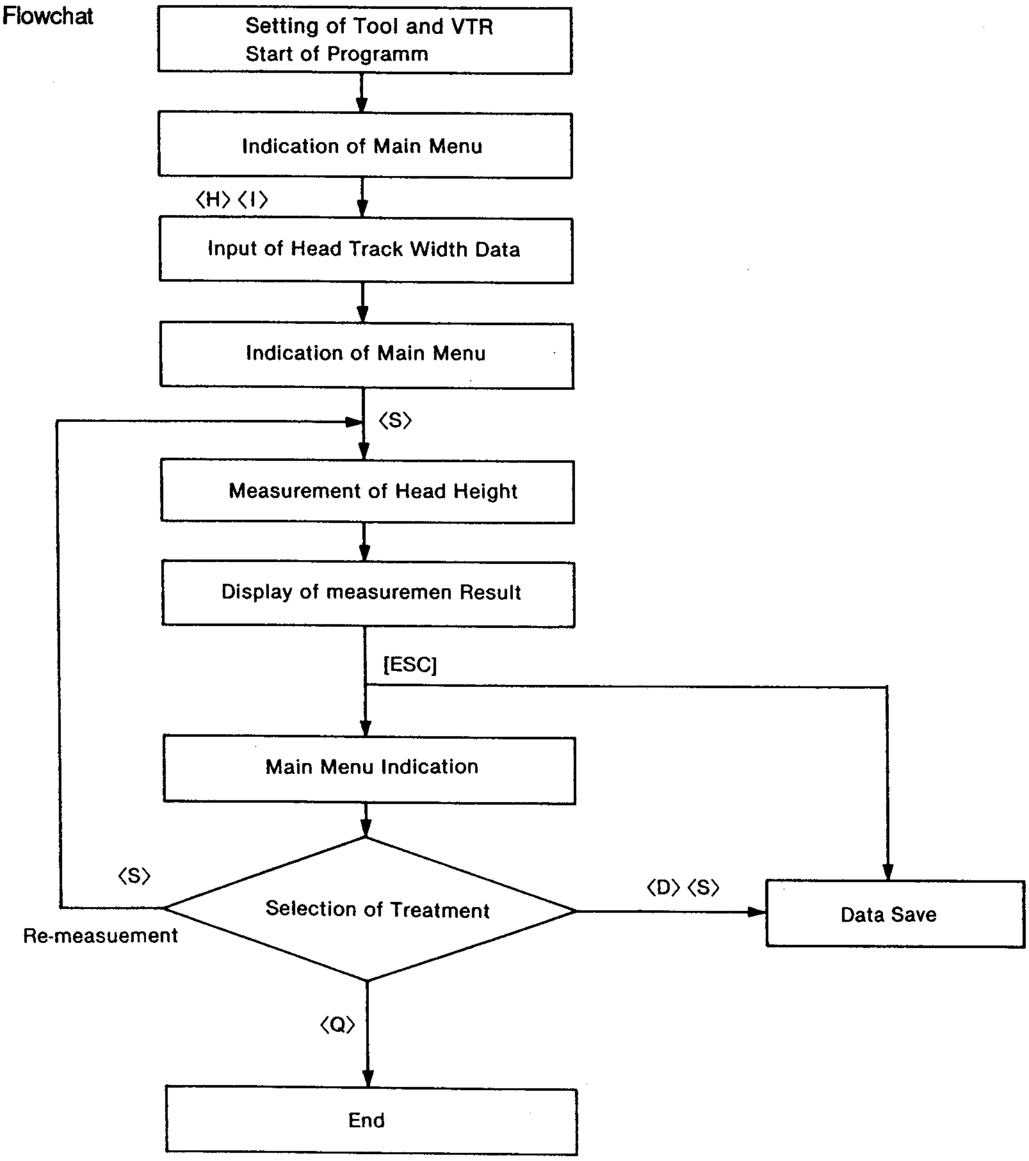
Make the Head Track Width Data to the default value.

<R> RETURN TO MENU

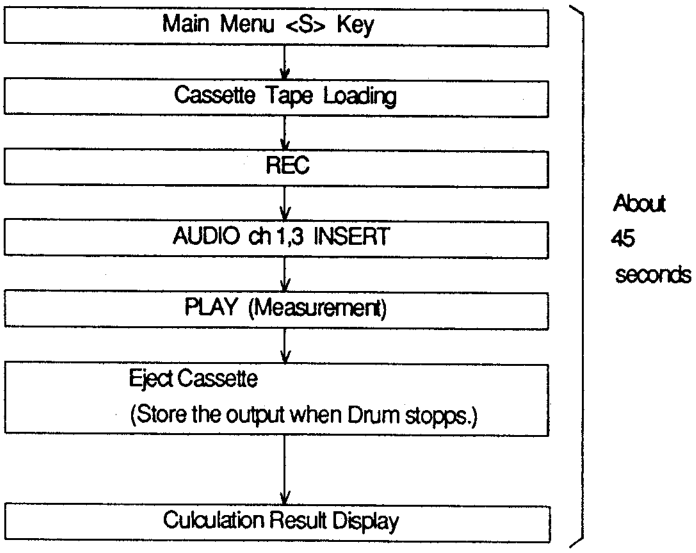
Return to Main Menu

(3) FLOWCHART OF FE HEAD HEIGHT MEASUREMENT AND ALIGNMENT

Alignment Flowchat


Setting of Tool and VTR
Start of Programm
Indication of Main Menu
〈H〉〈I〉
Input of Head Track Width Data
Indication of Main Menu
〈S〉
Measurement of Head Height
Display of measuremen Result
[ESC]
Main Menu Indication
〈S〉
Selection of Treatment
Re-measuement
〈D〉〈S〉
Data Save
〈Q〉
End

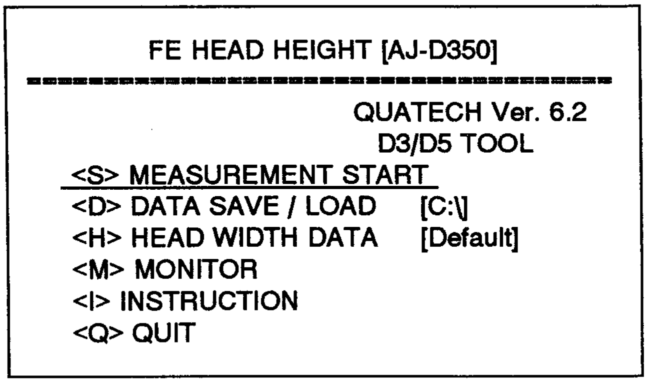
Measurement Flowchart


Main Menu <S> Key
Cassette Tape Loading
REC
AUDIO ch 1,3 INSERT
PLAY (Measurement)
Eject Cassette
(Store the output when Drum stopps.)
Culculation Result Display
About
45
seconds

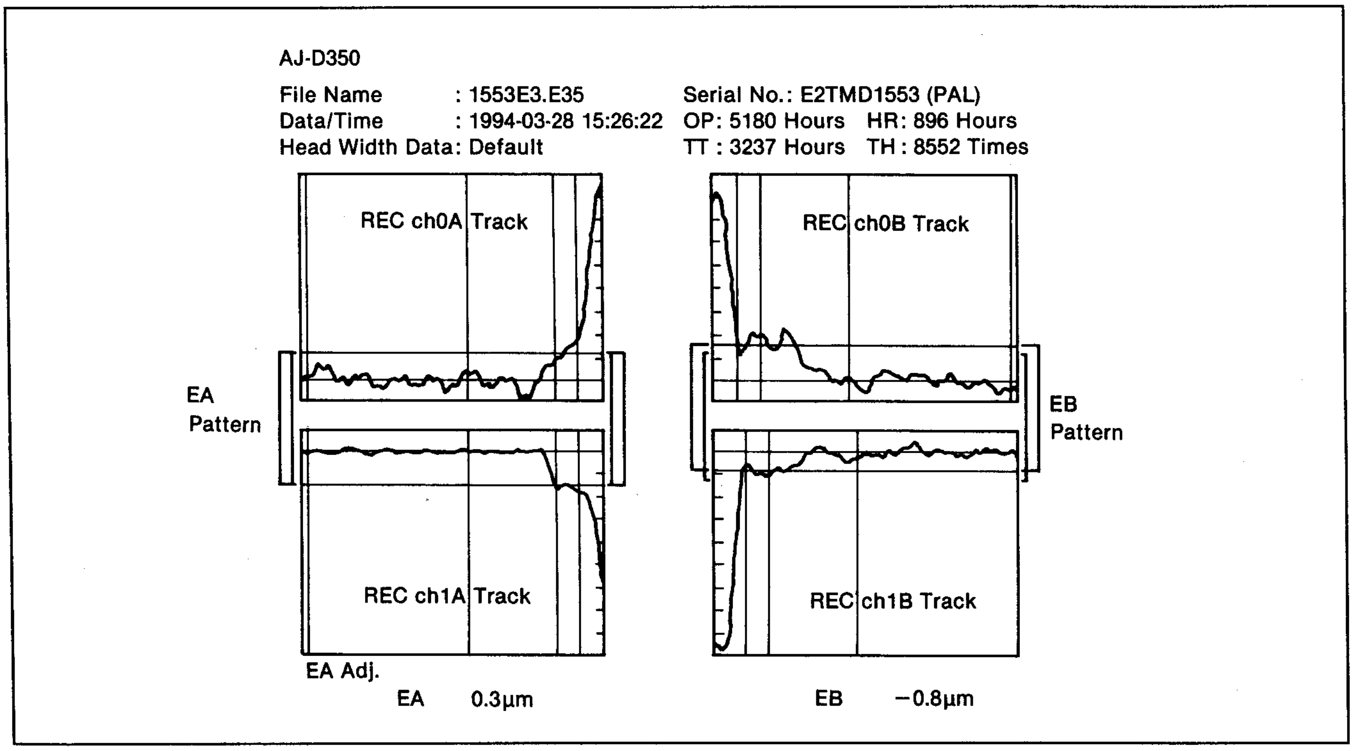
FE HEAD HEIGHT ADJUSTMENT

<TOOL CONDITION>
MODE : HEAD HEIGHT

1. Select the AJ-D350 FE HEAD menu in the MAIN menu.
2. Select the <H> HEAD WIDTH DATA in the FE HEAD menu, and input the number written on the center drum. If that number is not input, the default data can be used. Please refer to Rec Head width data input procedure.
3. Set the CONTROL mode in the VTR to REMOTE.
4. Hit <S> key and insert the D5 self recording tape.
5. The specification is 0 ± 1µm. If necessary, adjust each head height.
6. After the adjustment, make three times of measurement to confirm.



```
FE HEAD HEIGHT [AJ-D350]
========================================
                      QUATECH Ver. 6.2
                         D3/D5 TOOL
  <S> MEASUREMENT START
  <D> DATA SAVE / LOAD     [C:\]
  <H> HEAD WIDTH DATA      [Default]
  <M> MONITOR
  <I> INSTRUCTION
  <Q> QUIT
```

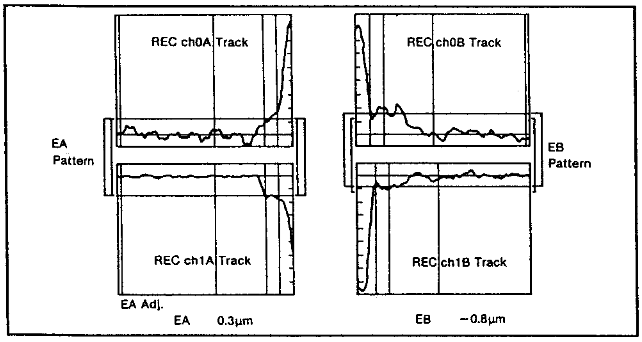


AJ-D350
File Name : 1553E3.E35   Serial No.: E2TMD1553 (PAL)
Data/Time : 1994-03-28 15:26:22   OP: 5180 Hours HR: 896 Hours
Head Width Data: Default   TT : 3237 Hours TH : 8552 Times

FLYING HEAD HEIGHT CONFIRMATION 1

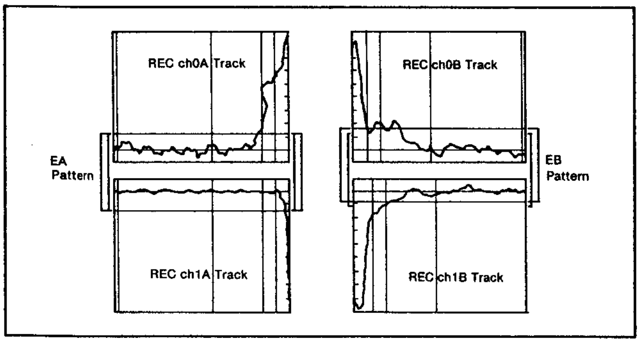
a) Head Height is correct

Output level of Entrance side of CHB and Exit side of CHA of Audio sector is same drop level as shown in figure.



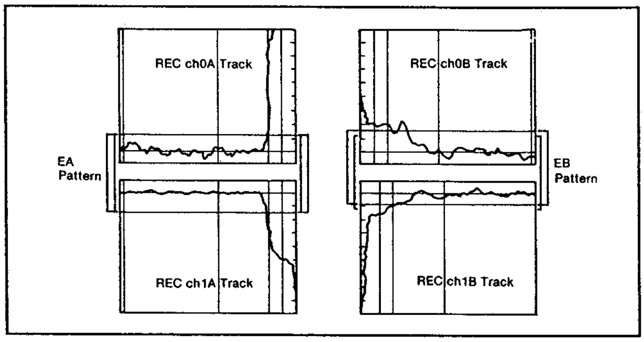
b) If FE CHA Head is Height about +20μm

- Output level of CH0 audio sector has different level as shown in figure.
- Output level of CH1 audio sector is at similar level to video as shown in figure.
  - * In this case, adjust the Hex screw of CHA Head in the direction the display indicated on.



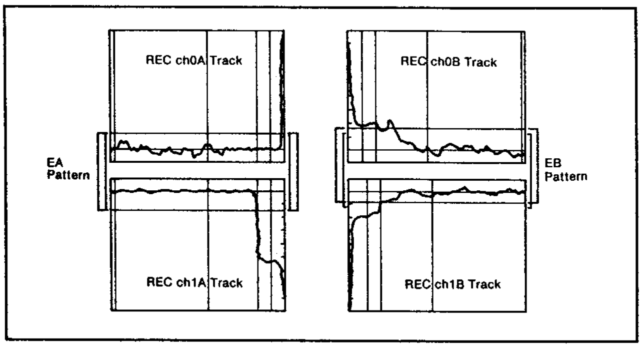
c) If FE CHA Head is Height about +20μm to +40μm.

- Output level of CH0 audio sector drops out as shown in figure.
- Output level of CH1 audio section has different level as shown in figure.
  - * In this case adjust the Hex screw of CHA head in a clockwise direction. The Head height goes down, disregard the display indication.



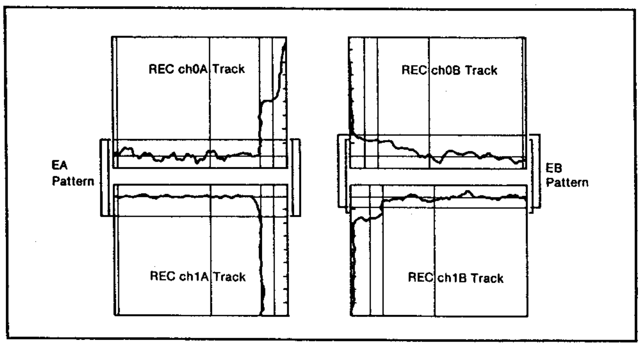
d) If FE CHA is low about -20μm

- Output level of CH0 audio sector is at a similar to video level as shown in figure.
- Output level of CH1 audio sector has different levels as shown in figure.
  - * In this care, adjust the Hex screw of CHA Head in the direction indicated on the display.



e) If FE CHA is low about -20μm to -40μm

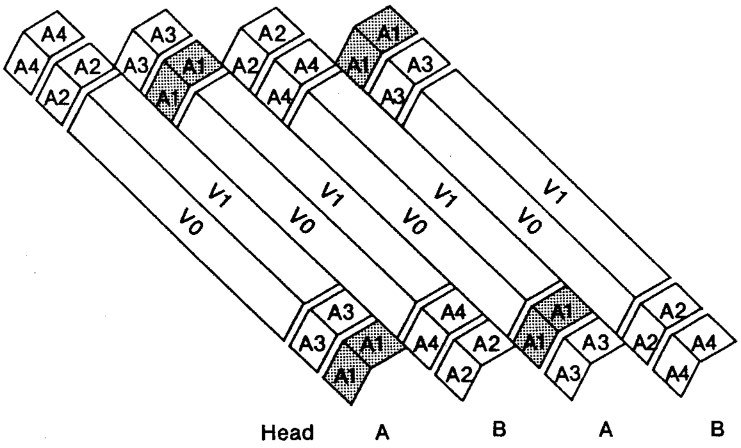
- Output level of CH0 audio sector has different level as shown in figure.
- Output level of CH1 audio sector drops out as shown in figure.
  - * In this case, adjust the Hex screw of CHA head to counterclockwise direction. This meaning is Head Height goes up, disregard the display indication.



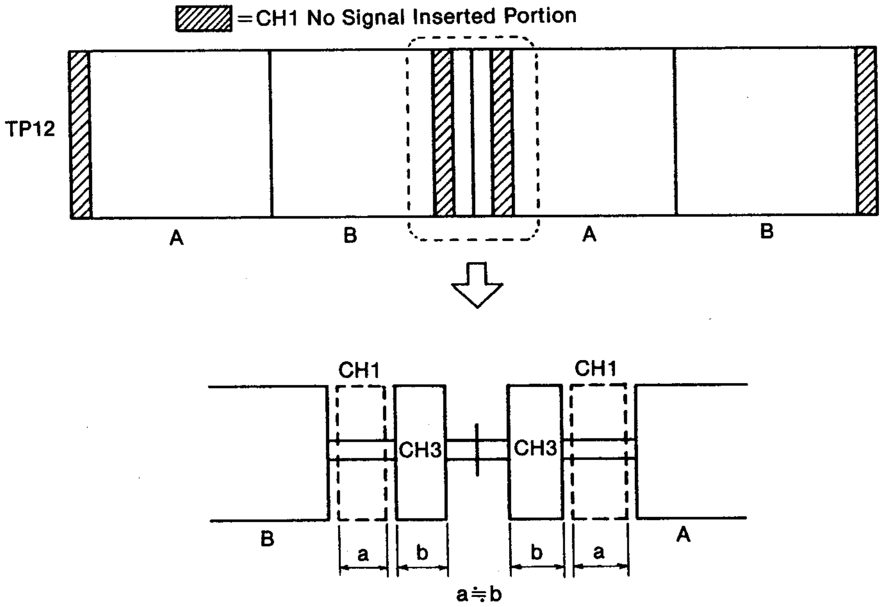
FLYING ERASE HEAD HEIGHT CONFIRMATION 2

1. Insert a work cassette into AJ-D350.
2. Record a color bar and 1KHz audio signal in a few minutes.
3. Rewind a tape to the recording start portion.
4. Disconnect P504 and P511 on the Rec Amplifier board to record no signal.
5. Insert audio CH1 on the just recorded portion.
6. Connect a scope to TP12 (CH1 ENV) and TP207 (TRG) on the Rec Amplifier board.
7. Connect the P504 and P511 on the Rec Amplifier board.
8. Playback the just inserted portion and confirm that only audio CH1 is erased.
9. Confirm CH2 to CH4 using same method.

Insert No Signal to Audio CH1.


A4
A4
A2
A2
A3
A3
A1
A1
A2
A2
A4
A4
A1
A1
A3
A3
V1
V0
V1
V0
V1
V0
V1
V0
A3
A3
A1
A1
A4
A4
A2
A2
A1
A1
A3
A3
A2
A2
A4
A4
Head
A
B
A
B

Envelope Pattern


▨=CH1 No Signal Inserted Portion
TP12
A
B
A
B
CH1
CH1
CH3
CH3
B
A
a
b
b
a
a≒b

* If FE height is correct, a and b width is almost same.

RF ENVELOPE CONFIRMATION BY MODE CHANGE

To confirm the tape which is attached to the drum rabbet, the following steps is necessry.

<STEP 1>

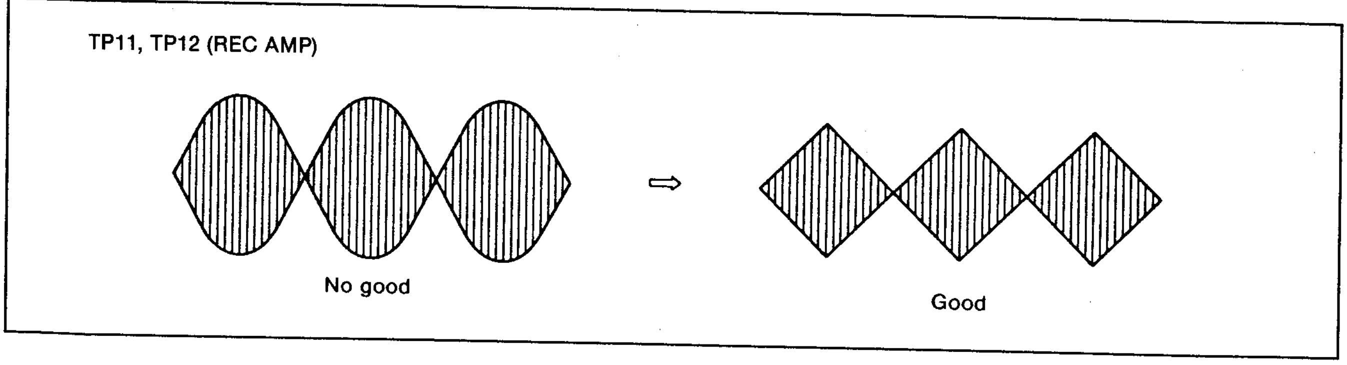
1. Connect the SCOPE CH1 to TP11 (REC AMP BOARD) and CH2 to TP207 (REC AMP BOARD).
2. Insert the Alignment Tape No.2 (0~16min).
3. Change the VTR mode from REW to PLAY and confirm that the envelope is recovered to normal PB condition at the entrance side within 1 second.
4. Change the VTR mode from EJECT to PLAY and confirm that the envelope is recovered to normal PB condition at the entrance side within 1 second.
5. Once place the unit in the STAND BY OFF condition.
   Change the mode to STAND BY ON and then PLAY, and confirm the envelope is recovered to normal PB condition within 1 second.
6. If out of specification, readjust each post as follows.
   a) Entrance side : P3, P4 and P5 Height adjustment
   b) Exit side : P6, Post Height and A/C head tilt adjustment
   c) Center portion : UPPER DRUM position adjustment

<STEP 2>

1. Arrange the computer and tool to Linearity measurement mode. (Use the Alignment tape No.3)
2. Connect the SCOPE CH1 to TP203 on the head amp of Linearity tool (VFK0832/VFK0832A).
3. Connect the SCOPE CH2 to TP207 (REC AMP BOARD) as trigger.
4. Touch the upper edge of the tape between P5 post and the drum on playing back so that the linearity waveform has a 3~4μm drop at the entrance side on computer display.
5. Release the tape and confirm that the envelope (TP203) is recovered to normal PB condition within 1 second on the oscilloscope.
6. Touch the upper edge of the tape between P6 post and the drum on playing back so that the linearity waveform has a 3~4μm drop at the exit side on computer display.
7. Release the tape and confirm that the envelope (TP203) is recovered to normal PB condition within 1 second on the oscilloscope.
8. Flip the P3 post gently on playing back and confirm that envelope (TP203) is recovered to normal PB condition within 0.5 second.
9. If out of specification, readjust each post as follows.
   a) Entrance side : P3, P4 and P5 Height adjustment
   b) Exit side : P6 Post Height and A/C head tilt adjustment

<STEP 3>

1. Insert the alignment tape and play back the color bar portion.
2. Place the unit in the STILL mode.
3. Connect the scope CH1 to TP11 and CH2 to TP12 on the REC AMP board. Trigger is TP207 on the REC AMP Board.
4. Confirm that the envelope is diamond shape as shown below.
5. If it is not, readjust P3 tilt adjustment.

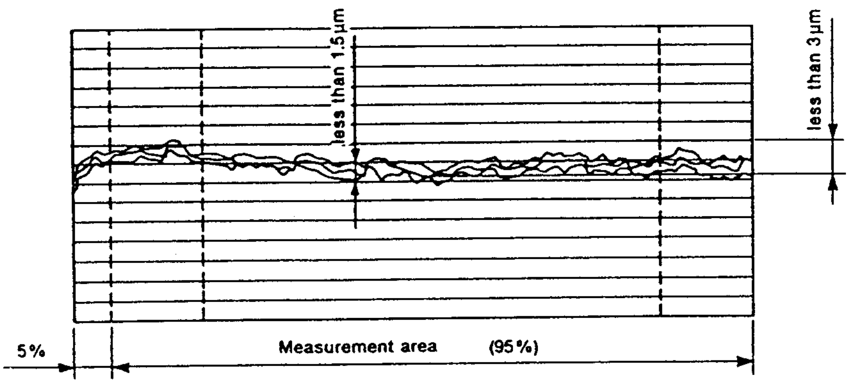


6. Place the unit in the VAR × -1 mode. Make sure that the bottom edge of the tape touches the lower flange of the P7 post without tape curling. If tape curling occurs at the bottom flange of the P7 post, lower both P9 and P10 post slightly than the P8 post until the tape curling disappears.

LINEARITY AND WAVING CONFIRMATION

WAVING CONFIRMATION

1. Set the computer and tool to Linearity measurement mode.
2. Play back the alignment tape No.3.
3. When the space key is pressed, computer is set to the peak hold mode. After 30 seconds computer display indicates the average data.
4. Confirm the waving (less than 1.5µm).



LINEARITY FINAL CONFIRMATION

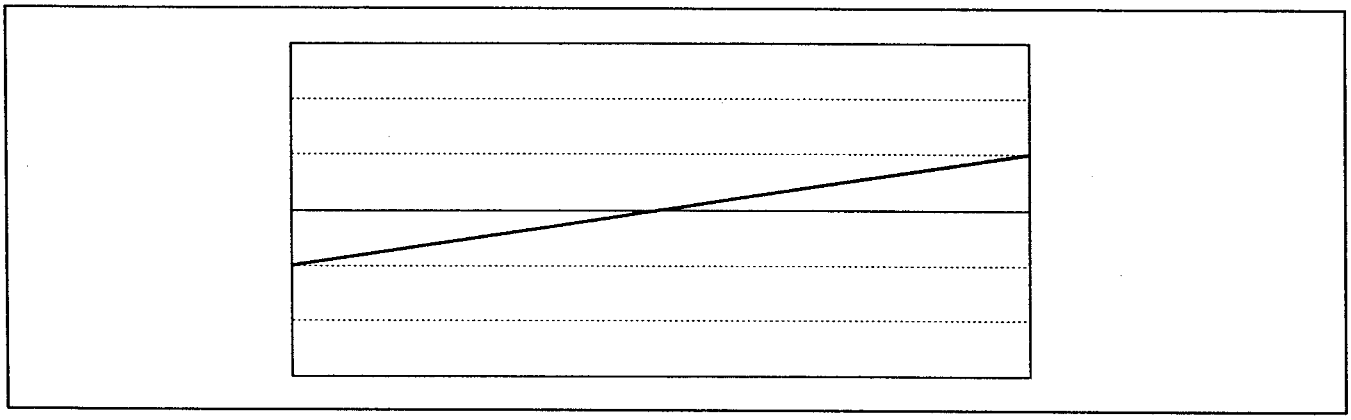
1. Playback the alignment tape No.3.
2. Set the computer and tool to Linearity measurement mode.
3. Play back the alignment tape No.3.
4. When the space key is pressed, computer is set to the peak hold mode. After 30 seconds computer display indicates the average data.
5. Confirm that the linearity is within 3µm at measurement area.

Note: If some noise occurs during PEAK HOLD mode, it may be caused by the tape.
In this case the measurement can be done by using better portion of the tape with PEAK HOLD mode released.

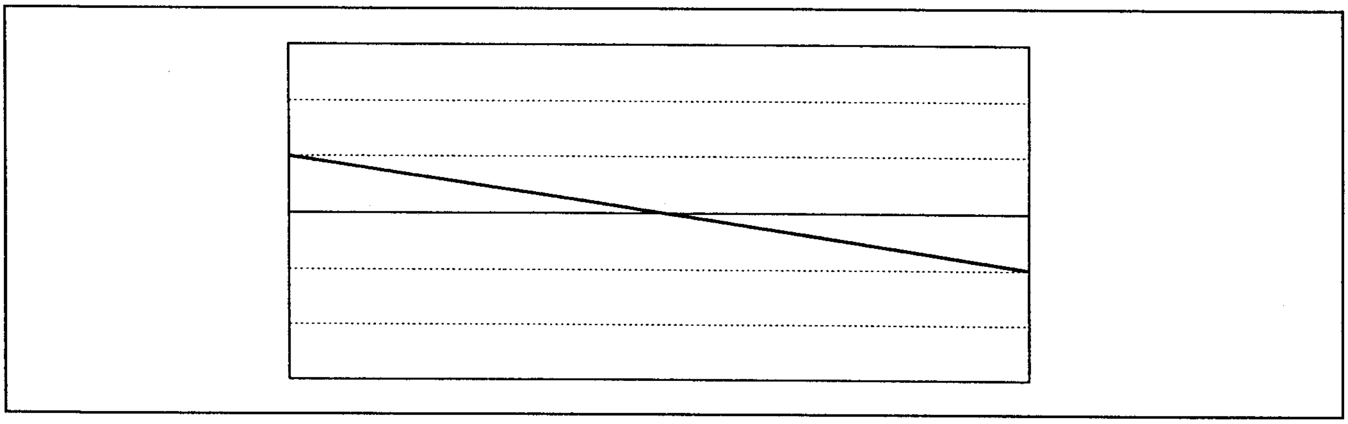
LINEARITY CURVE CONFIRMATION

If the linearity curve is not straight horizontaly, use the Drum Axis Verticality Unit and adjust the drum axis position.
(Drum Axis Verticality Unit is introduced on Feb. '95)
Please refer adjustment procedure.

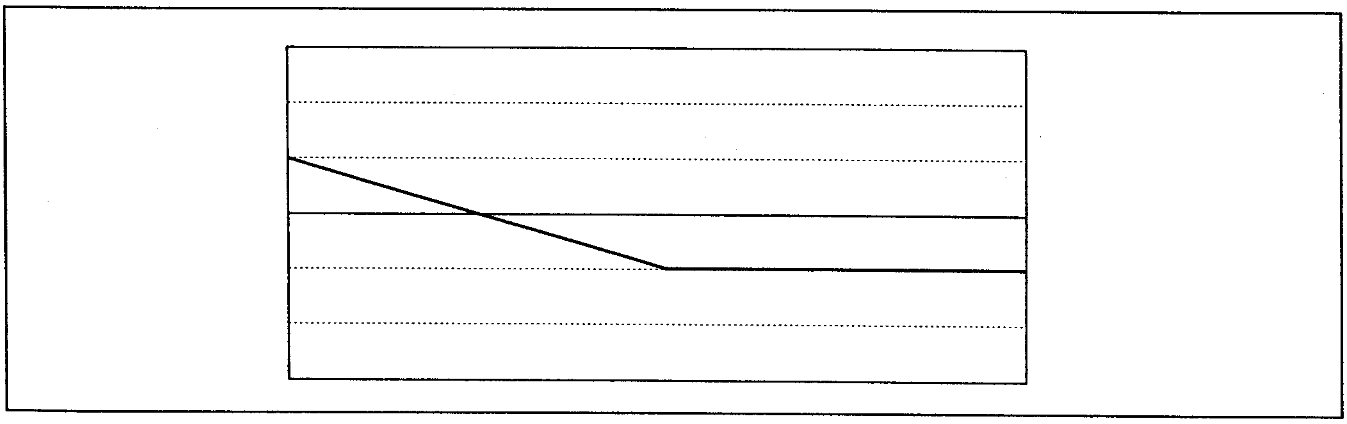
1. CURVE (A): Linearity increases toward the exit side.



2. CURVE (B): Linearity decreases toward the exit side.



3. CURVE (C): Linearity decreases to center portion and then becomes flat toward the exit side.



Introduction of Drum Axis Verticality Adjustment Procedure

Drum Axis Verticality Unit is introduced on Feb. '95 from serial No. B2TMGxxxx.
Drum Unit without this unit is necessary to attach it. Please refer following procedure.

(Preparation)

1. Grate the top portion (3mmø) of Fine Adjustment Screwdriver (VFK0446) from 3mm to 2mm. (refer to Figure 2).

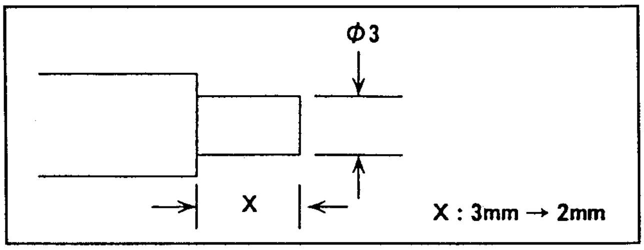


Figure 1

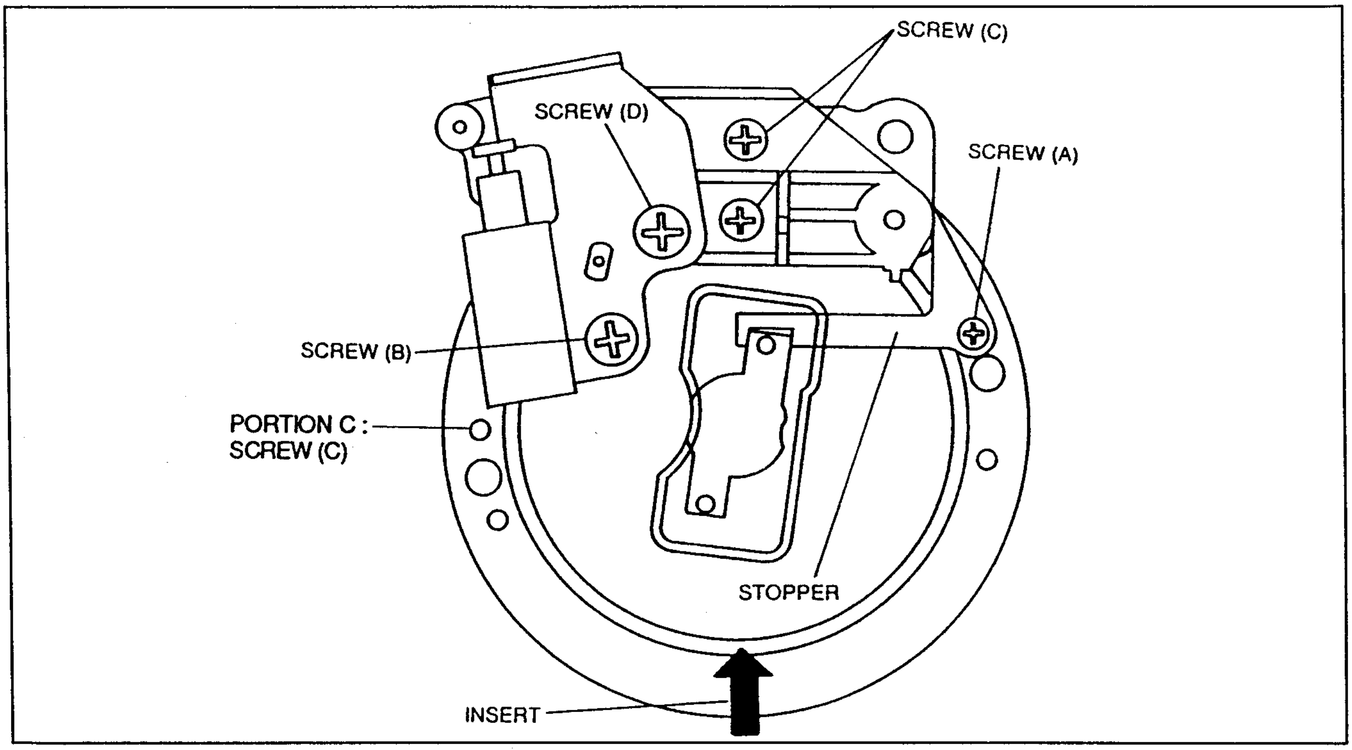


Figure 2

(Attachment Procedure)

Caution: When Drum Axis Verticality Unit is installed, it is necessary to power off the VTR.

1. Confirm whether a hole is made to the potion (C) on the Upper Drum.
   a. If there is a hole at the (C) portion, install as shown below; (refer to Figure 2)
      1) Unscrew the screw (A) to remove the stopper.
      2) Install the base to the Upper Drum following the arrow in Figure 2.
      3) Tighten the screw (A) and (C).
      * It is not necessary to use the attachment angle.
   b. If there is no hole at the (C) portion, install as shown below (refer to Figure 2).
      1) Combine the attachment angle with the base and fix with screw (E)(refer to Figure 3).
      2) Unscrew the screw (A) to remove the stopper (refer to Figure 2).
      3) Unscrew the screw (B)
      Caution: Do not loosen the screw (D).
      4) Install the base with the attachment angle to the drum. Follow the arrow in Figure 2.
      5) Tighten the screw (A) and screw (B).

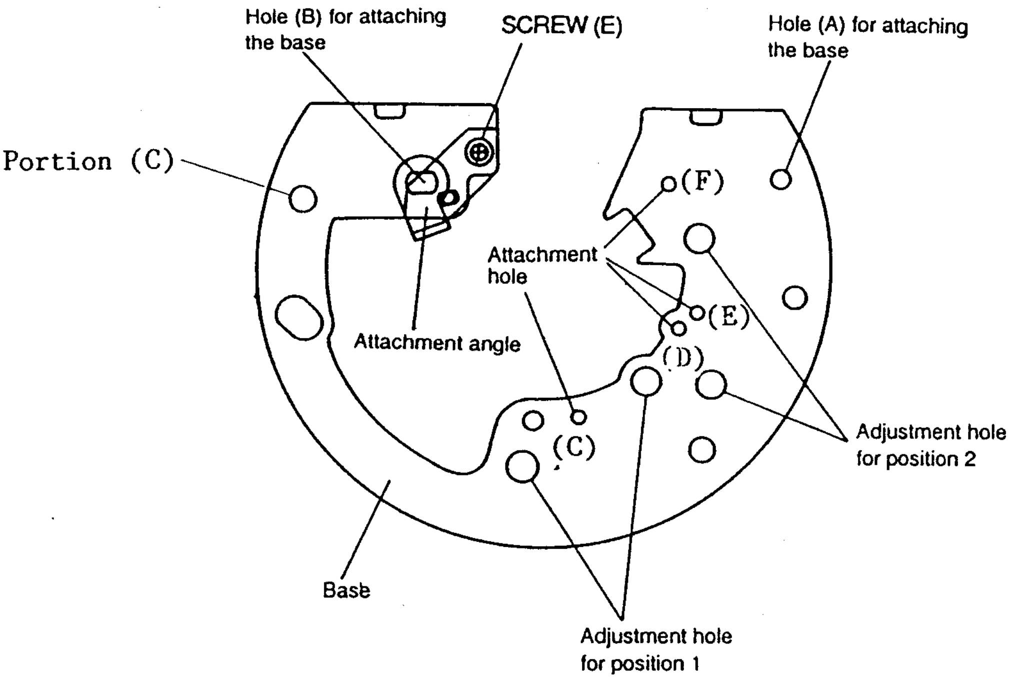

Hole (B) for attaching the base
SCREW (E)
Hole (A) for attaching the base
Portion (C)
(F)
Attachment hole
(E)
Attachment angle
(D)
(C)
Adjustment hole for position 2
Base
Adjustment hole for position 1

Figure 3

2. **Install the Drum Axis Verticality unit to position 1 or position 2 according to the linearity curve. (refer to adjustment procedure).**

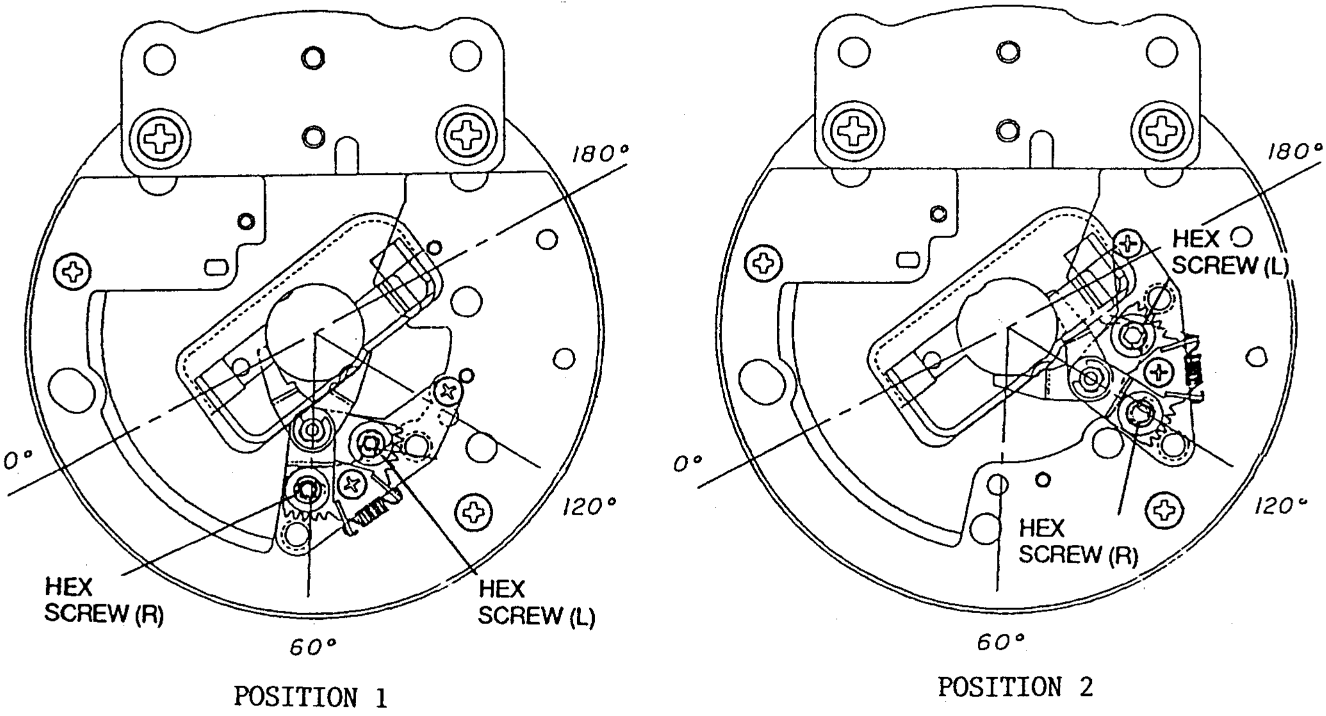
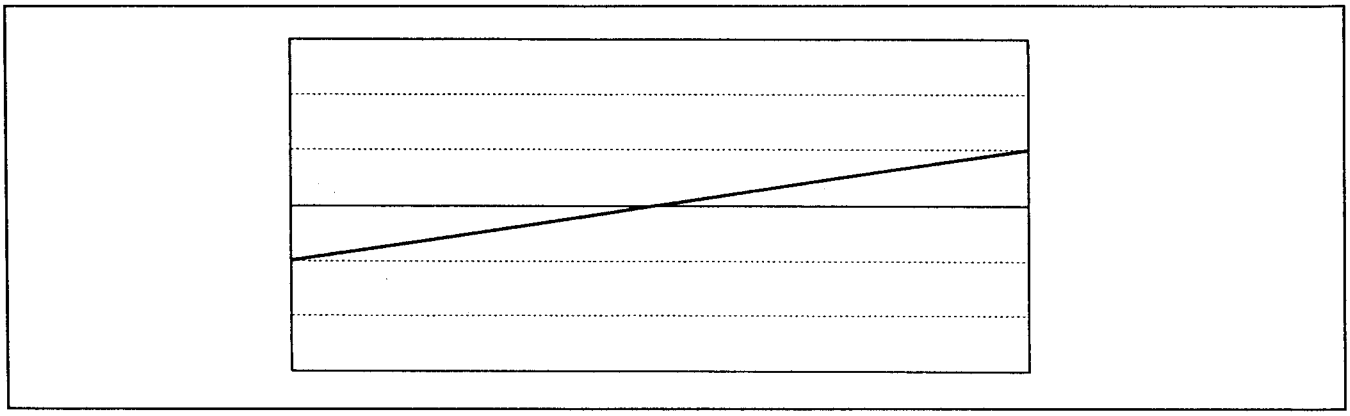

180°
0°
120°
60°
HEX SCREW (R)
HEX SCREW (L)
POSITION 1
180°
HEX SCREW (L)
0°
HEX SCREW (R)
120°
60°
POSITION 2

Figure 4

(Adjustment Procedure)

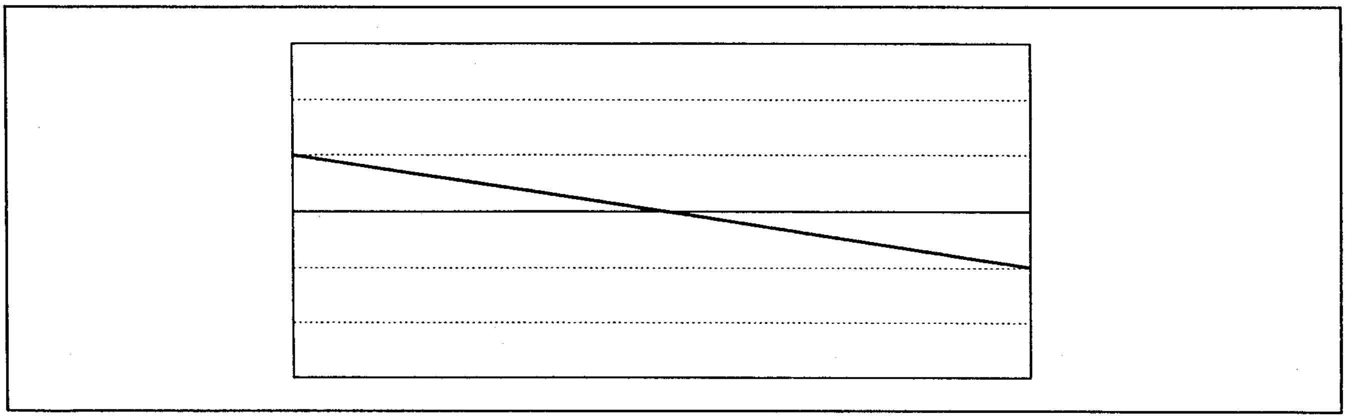
(1) CURVE (A): Linearity increases toward the exit side.



PUSH the Axis toward 180 degrees direction.

1) Remove the screw (L)(refer to Figure 4).
2) Install the Axis Verticality (1) U to position 1 by using attachment hole (C) and (D)(refer to Figure 3).
3) Loosen the screw (R) and insert the fine adjustment screwdriver to the adjustment hole.
4) Adjust the linearity by rotating the screwdriver counterclockwise.
5) After the adjustment, tighten the screw (R)(2.5kgf·cm).

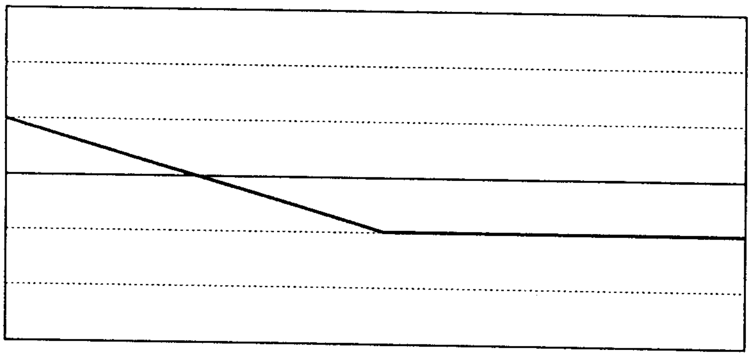
(2) CURVE (B): Linearity decreases toward the exit side.



PUSH the Axis toward 0 degrees direction.

1) Remove the screw (R)(refer to Figure 4).
2) Install the Axis Verticality (1) U to position 2 by using attachment hole (E) and (F)(refer to Figure 3).
3) Loosen the screw (L) and insert the fine adjustment screwdriver to the adjustment hole.
4) Adjust the linearity by rotating the screwdriver clockwise.
5) After the adjustment, tighten the screw (L)(2.5kgf·cm).

3) CURVE (C): Linearity decreases to the center portion and then becomes flat toward the exit side.



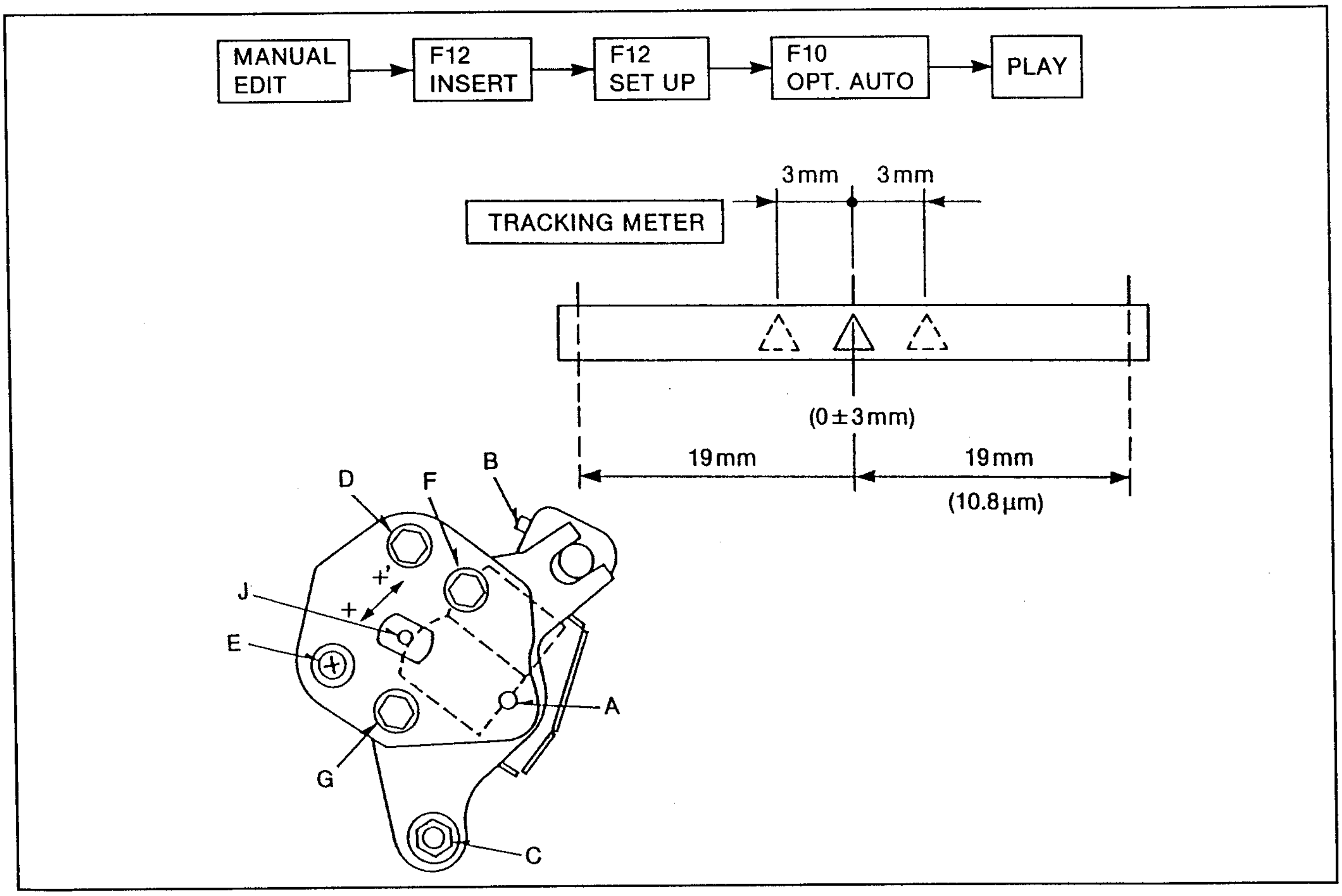
PUSH the Axis toward 300 degrees direction

1) Remove the screw (R)(refer to Figure 4).
2) Install the Axis Verticality (1) U to position 1 by using attachment hole (C) and (D)(refer to Figure 3).
3) Loosen the screw (L) and insert the fine adjustment screwdriver to adjustment hole.
4) Adjust the linearity by rotating the screwdriver clockwise.
5) After the adjustment, tighten the screw (L)(2.5kgf·cm).

A/C HEAD HORIZONTAL POSITION FINE ADJUSTMENT

SPEC	0 ± 2µm (0 ± 3mm on the Tracking display)
MODE	Alignment tape No.2 (color bar shuffling OFF portion)
ADJ.	A/C Head Screw "F" and "G", Hole "J" (Torque 5Kg ± 1Kg)
TOOL	Eccentric Driver (ø2), VFK0358, VFK0878 and VFK0920

1. Insert the Alignment Tape No.2 (color bar shuffling OFF portion).
2. Set the machine condition as follows.
   MANUAL EDIT → F2 INSERT → F12 SET UP → F10 OPT AUTO
3. Press the PLAY button.
4. Confirm that the tracking meter include ± 2µm (±3mm) as shown in Figure.
5. If not, readjust the A/C Head horizontal position.

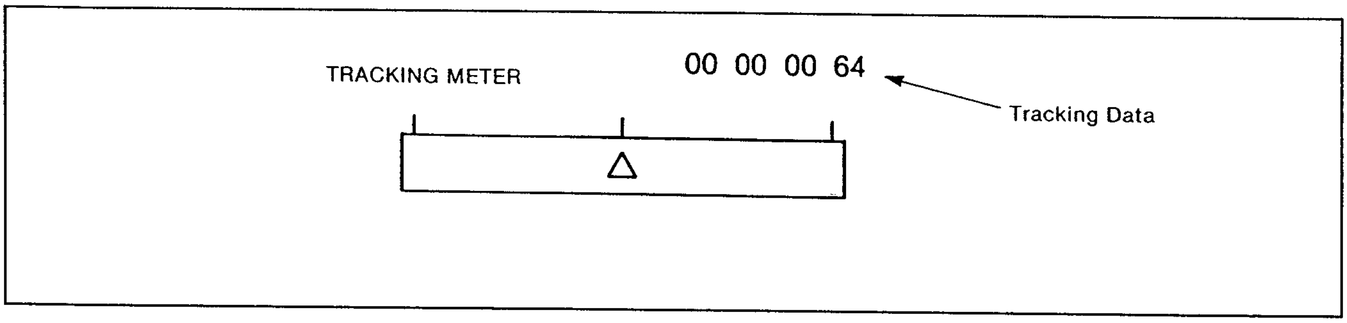

MANUAL EDIT
F12 INSERT
F12 SET UP
F10 OPT. AUTO
PLAY
TRACKING METER
3mm
3mm
(0±3mm)
19mm
19mm
(10.8µm)
D
F
B
J
+'
+
E
A
G
C

FIANL CONFIRMATION OF TRACKING OPTIMIZE

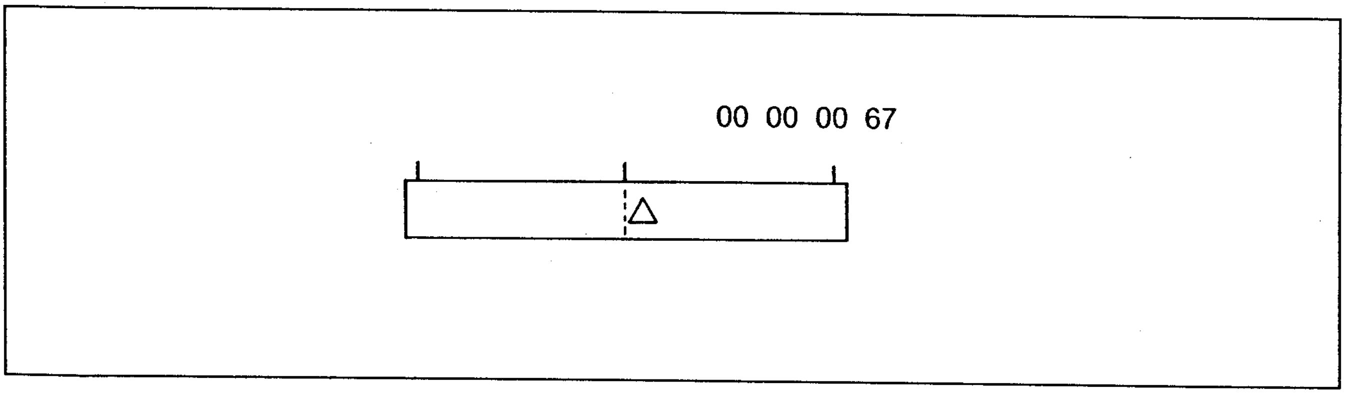
SPEC	0 ± 2μm (0 ± 3mm on the Tracking Display) (64 ± 11 at Tracking Data Display)
MODE	Alignment tape No.2 (Color Bar Shuffling OFF Portion)
ADJ.	A/C Head Screw "F" and "G", Hole "J"
TOOL	Eccentric Driver (ø2), VFK0358, VFK0878 and VFK0920

After adjusted the A/C Head Horizontal position, please confirm exact position of A/C Head as follows.

1. Set the Service SW 1-4 to ON on the front back panel.
2. Set the VTR to Tracking Data Monitoring mode as follows.
   HOME MENU F8 UB → MANUAL EDIT F2 INSERT → F12 SET UP → F10 OPT ONCE or OPT AUTO
3. During monitoring mode, Tracking data will be appeared at T/C position instead of T/C data as follows.

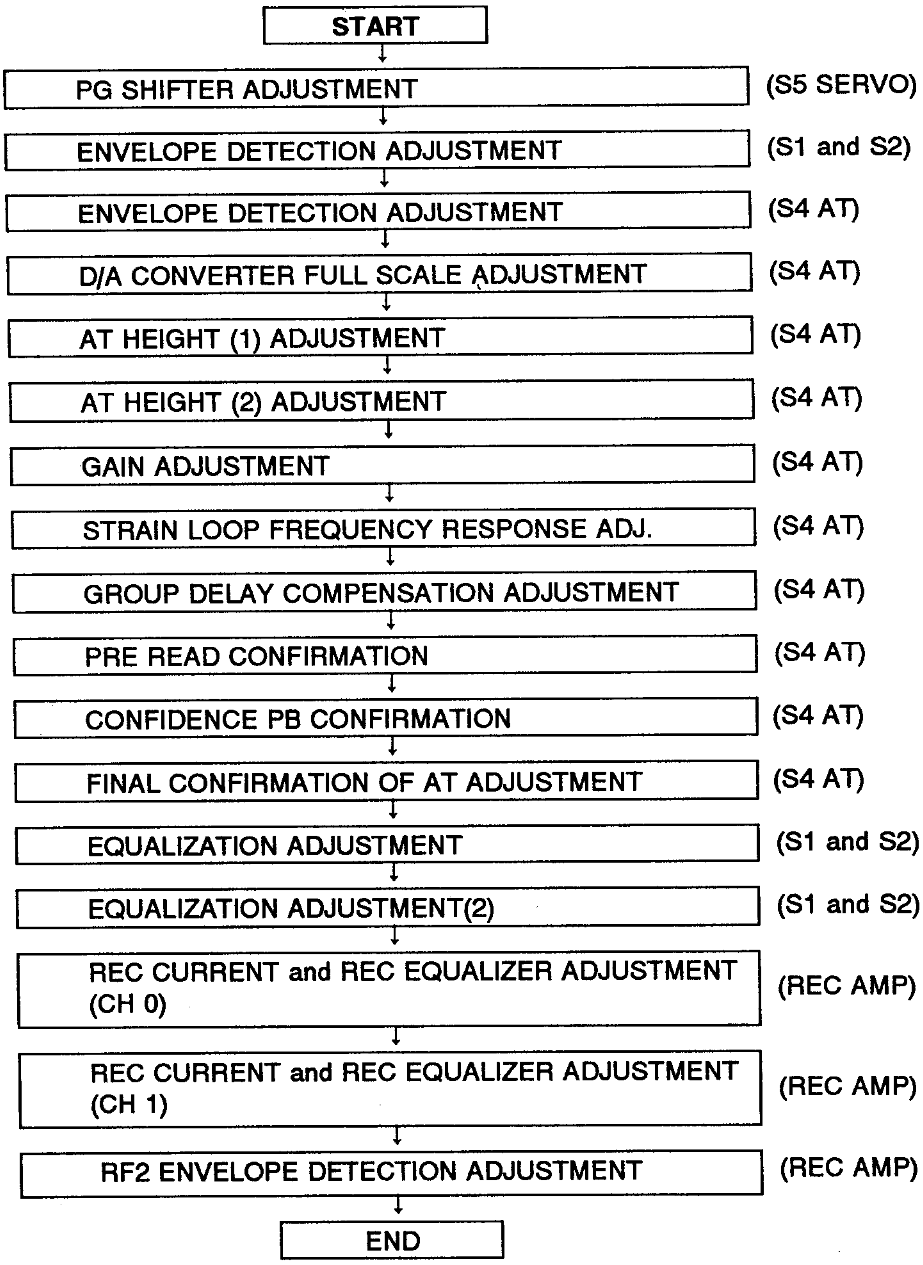


4. Insert the alignment tape No.2 (color bar shuffling OFF)
5. Press READY and PLAY bottom at same time.
6. High Speed Optimizing in progress.
7. After completed, display indicate tracking data as follows.
8. Read the indicated data at T/C position.



9. Repeat tracking optimize 2 ~ 3 times and get a average data.
10. If out of specification (6 ± 11) readjust A/C Head Horizontal position precisely.

DRUM ELECTRICAL ADJUSTMENT FLOWCHART


START
PG SHIFTER ADJUSTMENT (S5 SERVO)
ENVELOPE DETECTION ADJUSTMENT (S1 and S2)
ENVELOPE DETECTION ADJUSTMENT (S4 AT)
D/A CONVERTER FULL SCALE ADJUSTMENT (S4 AT)
AT HEIGHT (1) ADJUSTMENT (S4 AT)
AT HEIGHT (2) ADJUSTMENT (S4 AT)
GAIN ADJUSTMENT (S4 AT)
STRAIN LOOP FREQUENCY RESPONSE ADJ. (S4 AT)
GROUP DELAY COMPENSATION ADJUSTMENT (S4 AT)
PRE READ CONFIRMATION (S4 AT)
CONFIDENCE PB CONFIRMATION (S4 AT)
FINAL CONFIRMATION OF AT ADJUSTMENT (S4 AT)
EQUALIZATION ADJUSTMENT (S1 and S2)
EQUALIZATION ADJUSTMENT(2) (S1 and S2)
REC CURRENT and REC EQUALIZER ADJUSTMENT (CH 0) (REC AMP)
REC CURRENT and REC EQUALIZER ADJUSTMENT (CH 1) (REC AMP)
RF2 ENVELOPE DETECTION ADJUSTMENT (REC AMP)
END

PG SHIFTER ADJUSTMENT (S5:SERVO)

SPEC	T = 27.0 ± 0.5µsec [NTSC] T = 25.5 ± 0.5µsec [PAL]
TEST	TP11 (REC AMP) TP37 (SERVO)
MODE	PLAY
TAPE	75% COLOR BAR PORTION ALIGNMENT TAPE
M.EQ	OSCILLOSCOPE
INPUT	
ADJ.	SW2 (F2), SW3, SW4

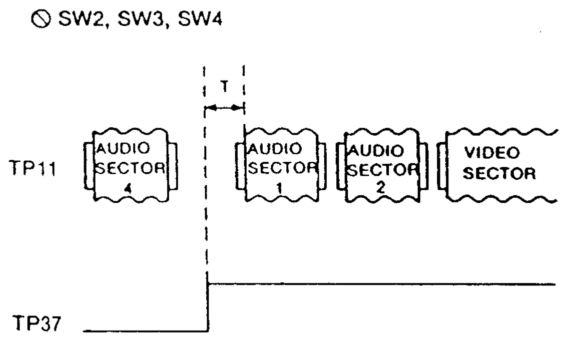
<STEP 1>
MENU CONDITION

TEST MENU

Select the TRACKING FIX/VAR F10 to "FIX".

<STEP 2>

1. SCOPE CH1 : TP11 (REC AMP)
   SCOPE CH2 : TP37 (SERVO)
2. SCOPE TRIGGER : CH2
3. Adjust SW2, 3 and 4 so that the period T is as shown in Figure.



(PAL) SPECIFICATION: T=25.5µsec±0.5µsec
(NTSC) T=27.0µsec±0.5µsec

SW2: Fine adjustment
SW3: Pre fine adjustment
SW4: Coarse adjustment

ENVELOPE DETECTION ADJUSTMENT
(S1 : REC/PLAY CH0)
(S2 : REC/PLAY CH1)

SPEC	ENVELOPE MINIMUM DC LEVEL = 0V±0.2VDC, ENVELOPE MAX.=2Vp-p±0.2V
TEST	TP502 [H4], TP400 [F4], TP8 [E2]
MODE	STILL
TAPE	SHUFFLING OFF 75% COLOR BAR ALIGNMENT TAPE
M.EQ	OSCILLOSCOPE
INPUT	
ADJ.	VR2(A/B GAIN BAL)[H1], VR500 (ENV GAIN)[I4], VR501 (ENV OFFSET) [I4]

5000 SERIES

<STEP 1>
MENU CONDITION

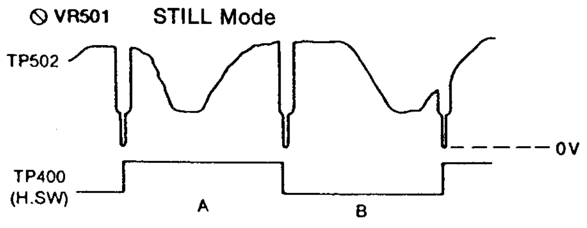
TEST SERVO AT

Set the [PATTERN] to "FIX".

SEARCH = CENTER
PATTERN = FIX

<STEP 2>

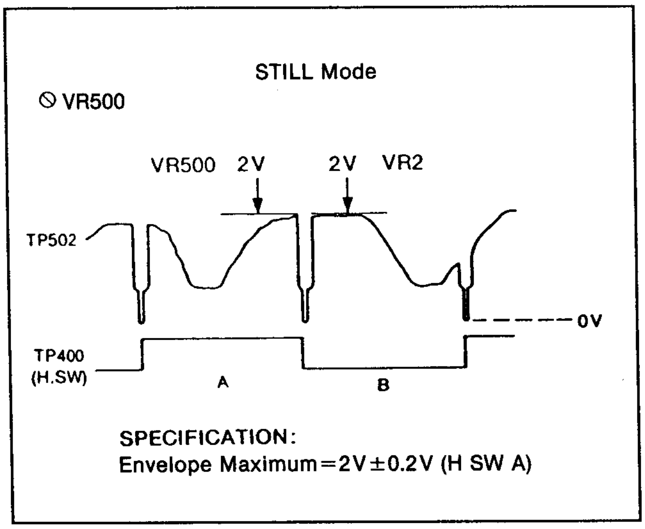
1. SCOPE CH1 : TP502
   SCOPE CH2 : TP400
2. SCOPE SETTING : 1V/DC
   SCOPE CH2 : 5V
3. SCOPE MODE : CHOP BW
4. SCOPE TRIG : CH2
5. SCOPE SWEEP : 2ms
6. Place the unit in the STILL mode.
7. Adjust VR501 so that the minimum signal level is 0V ± 0.2V as shown in Figure.



SPECIFICATION:
Envelope minimum DC level is 0V±0.2V DC.

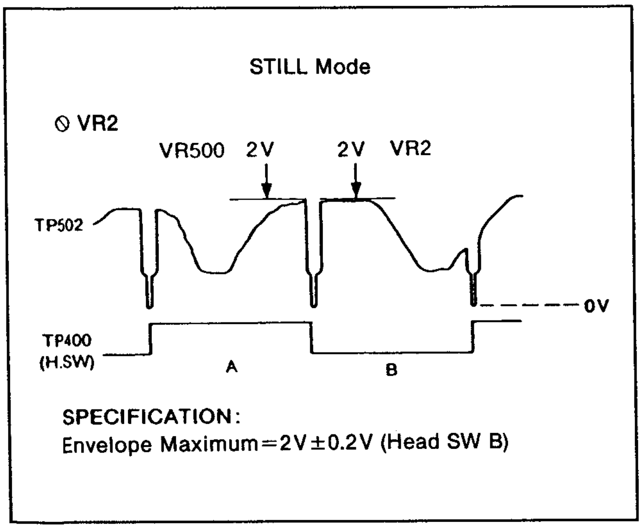
<STEP 3>

1. SCOPE CH1 : TP502
   SCOPE CH2 : TP400
2. Rotate capstan shaft by hand (CCW) and set the Envelope becomes maximum during Head Switch A portion.
3. Adjust VR500 (ENV GAIN) so that the maximum envelope level is 2V ± 0.2V.



SPECIFICATION:
Envelope Maximum=2V±0.2V (H SW A)

4. Rotate capstan shaft by hand (CCW) and set the Envelope becomes maximum during Head switch B portion.
5. Adjust VR2 (A/B GAIN BAL) so that the maximum envelope is 2V ± 0.2V.
6. After adjustment set the AT HEIGHT is 0.
7. After this adjustment, item 8-1 ENVELOPE DETECTION ADJUSTMENT is required.



SPECIFICATION:
Envelope Maximum=2V±0.2V (Head SW B)

AT (S4) BOARD MACHINE CONDITION

MACHINE CONDITION

1. Disconnect the P523 on the H.A. REGULATOR (S) P.C.B. which is located at right side of the Mechanism.
   while adjustment 8-1 through 8-6.
   Connect P523 from adjustment 8-7.

MENU CONDITION
TEST MENU
↓
AT SERVO TEST MENU

Set the each functions as follow.

1. F4: SEARCH = "CENTER"
2. F5: PATTERN = "ENABLE"
3. F8: AT HEIGHT = Ach "0"
   Bch "0"
4. SW2601 [D2] on S4 board is OPEN.
5. Error correction switches on L3 board are all OFF.
6. Error concealment switch on L4 board is OFF.

ENVELOPE DETECTION ADJUSTMENT (S4 : AT)

SPEC	0.7V ± 0.1VDC, PEAK = +3V ±0.1VDC
TEST	TP2611 (ENV CH1)[D1], TP2612 (ENV
MODE	STOP, EJECT, SW2601 = OPEN, P523 = OFF SEARCH = CENTER, PATTERN = ENEBLE
TAPE	75% COLOR BAR PORTION ALIGNMENT TAPE
M.EQ	OSCILLOSCOPE
INPUT	
ADJ.	VR2601[F2],VR2603[D4],VR2602[F2],VR2604[E4]

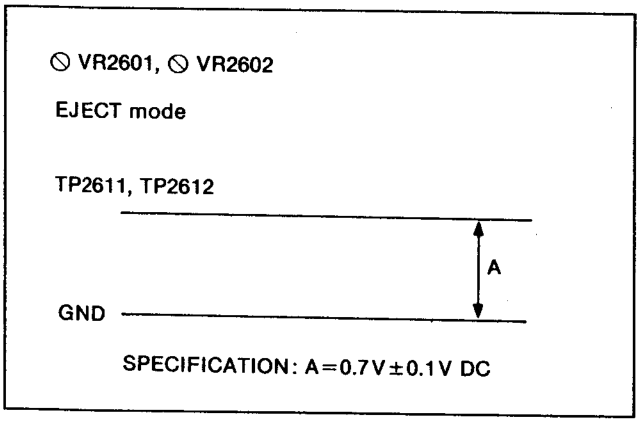
<STEP 1>
MENU CONDITION
Refer to the Machine Condition and Menu Condition at the beginning of this SECTION. P523 = OFF

<STEP 2>

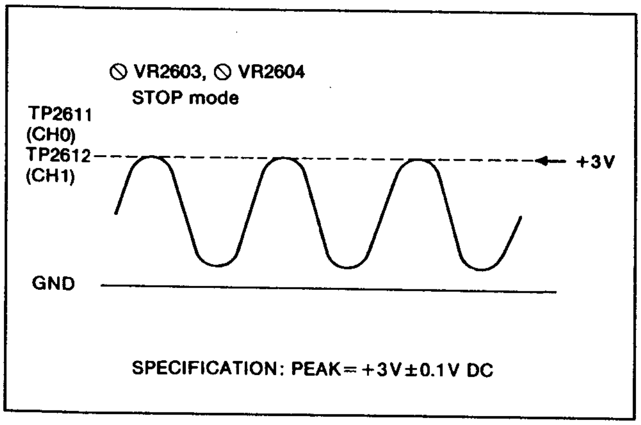
1. SCOPE : CH1 TP2611
   SCOPE : CH2 TP2612
2. Set the VTR in EJECT mode.
3. Adjust VR2601 and VR2602 so that the level of waveform is 0.7V ± 0.1 V DC.

<STEP 3>

1. SCOPE : CH1 TP2611
   SCOPE : CH2 TP2612
2. Set the VTR in STOP mode.
3. Rotate the capstan shaft by hand, and set the waveform peak becomes maximum.
4. Adjust VR2603 and VR2604 so that the level of waveform is 3V ± 0.1V DC.
5. Note that VR2601/VR2602/VR2603/VR2604 effect each other.
   Repeat step 2 and 3 and confirm that each adjustment is in specification.


⊘ VR2601, ⊘ VR2602
EJECT mode
TP2611, TP2612
A
GND

SPECIFICATION: A=0.7V±0.1V DC


⊘ VR2603, ⊘ VR2604
STOP mode
TP2611
(CH0)
TP2612
(CH1)
+3V
GND

SPECIFICATION: PEAK=+3V±0.1V DC

D/A CONVERTER FULL SCALE ADJUSTMENT (S4 : AT)

SPEC	5.0V ± 0.1VDC
TEST	TP2606 [B1], TP2607 [B2]
MODE	EJECT SW2601-OPEN, P523-OFF, SEARCH-CENTER, PATTERN-FIX
TAPE	
M.EQ	OSCILLOSCOPE
INPUT	
ADJ.	VR2613 (DA1FS)[B2], VR2614 (DA2FS)[B2]

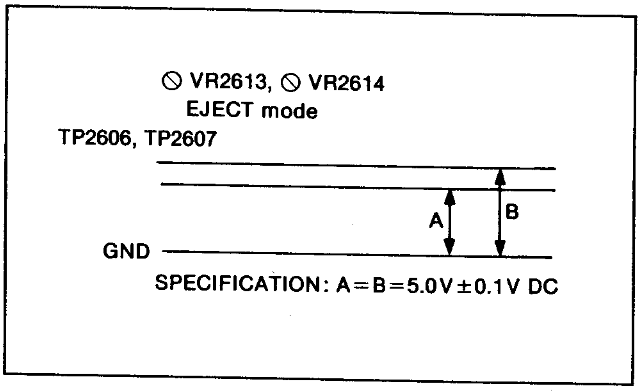
<STEP 1>

MACHINE CONDITION

1. Set the VTR in EJECT mode.
2. Set the AT mode to SEARCH = CENTER and PATTERN = FIX in the AT TEST Menu.

<STEP 2>

1. SCOPE CH1 : TP2606
   SCOPE CH2 : TP2607
2. Adjust VR2613 and VR2614 so that the voltage at TP2606 and TP2607 are +5V ± 0.1V DC.
3. Adjust VR2613 and VR2614 so that the difference voltage between TP2606 and TP2607 are within 0.05V.
   If the both voltage at TP2606 and TP2607 are 5.0V DC, then it is OK. If the one of the voltage is 4.9V adjust the other level is same level.
4. Note that the VR2613 and VR2614 effect each other.


⊘ VR2613, ⊘ VR2614
EJECT mode
TP2606, TP2607
A
B
GND

SPECIFICATION: A=B=5.0V±0.1V DC

AT HEIGHT (1) ADJUSTMENT (S4 : AT)

SPEC	TP2619 PULSE IS LOCATED AS Shown in figure
TEST	TP2610[F1],TP2619[F1],TP5006[C2],TP5007 (H.A REGULATOR S)[C1] TP2606, TP2607
MODE	VAR×1, SW2601=OPEN, P523-ON, SEARCH=CENTER, PATTERN=ENABLE
TAPE	75% COLOR BAR PORTION ALIGNMENT TAPE
M.EQ	OSCILLOSCOPE
INPUT	
ADJ.	VR2605[F1], VR2606[F1]

<STEP 1>

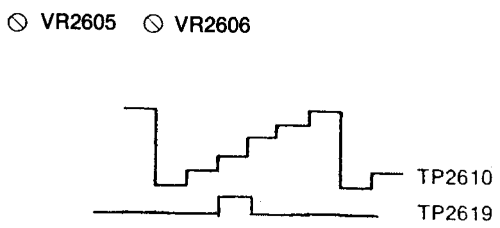
SCOPE CH1 : TP2610 Segment Pattern
SCOPE CH2 : TP2619 Pulse
SCOPE CH3 : TP5006 Drive Voltage
SCOPE CH4 : TP5007 Drive Voltage

<STEP 2>

1. Field or Frame Still Option (Setup/Home/AT Play)
2. Center/Enable (Test/Servo/AT)
3. SW2601 open
4. Variable X1 Playback
5. 75% Color Bar Alignment tape, shuffling ON
6. Zero the AT Head Heights from the front panel. (Height ON/ BS with F9/left & right cursors, with the front panel knob).

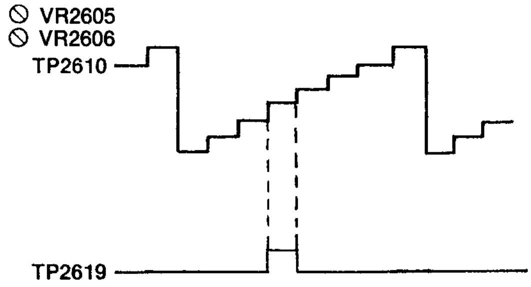
<STEP 3>

1. Initially, adjust the deflection pattern voltages at TP5006 & 5007 are 0 volts DC by VR2605 & VR2606 during VAR X1 playback. This centers the AT heads.
2. Next, fine adjust these pots to achieve three conditions
   - A) Proper rising stairstep and pulse timing at TP2610 & 2619. (The stairs are rising from left to right, there are 6 or 8 steps (for NTSC or PAL), and the pulse is aligned with the highest step.
   - B) Maximum RF on the 4 "Envelope" bar graphs on the Test/Servo/AT screen.
   - C) The segment LED D609 on the AT board should be off.
3. The drive voltage at TP5006 & 5007 will have changed, but they should still be within the range of zero volts, plus or minus fifty volts.
4. Note the voltages at TP5006 & 5007 for use in subsequent adjustments.



SPECIFICATION: TP2619 pulse is located at the third step of TP2610

(NTSC)

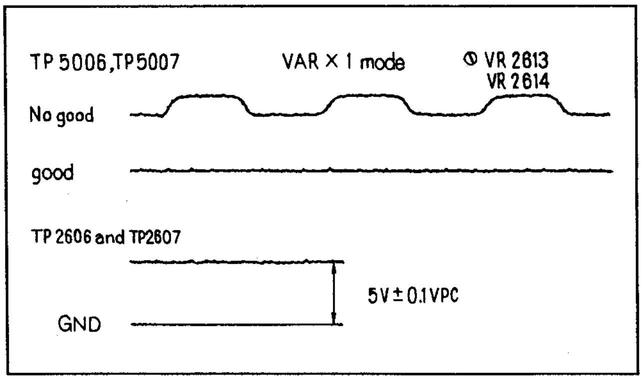


SPECIFICATION: TP2619 pulse is located at the fourth step of TP2610

(PAL)

Note:

1. In this adjustment if output drive voltage waveforms (TP5006 and TP5007) are not flat like a pulse. VR2613 and VR2614 adjustments are required as shown in Figure.
2. Place the unit in VAR × 1 mode.
3. Adjust VR2613 and VR2614 so that the output waveform are flat as shown in Figure.
4. Confirm that the voltage at TP2606 and TP2607 are +5V ± 0.1VDC. (8-3. D/A CONVERTER FULL SCALE ADJUSTMENT)



AT HEIGHT (2) ADJUSTMENT (S4 : AT)

SPEC	TP2619 PULSE IS LOCATED AT PEAK OF TP2610
TEST	TP2610[F1],TP2619(TRIGGER)[E1], TP5006[C2],TP5007(H.A REGULATOR S)[C1] TP2629, TP2630
MODE	VAR, SW2601-CLOSE, P523-ON, SEARCH - CENTER, PATTERN- ENABLE
TAPE	75% COLOR BAR PORTION ALIGNMENT TAPE
M.EQ	OSCILLOSCOPE
INPUT	
ADJ.	VR2609(STR OS A)[G1], VR2610(STR OS B)[H1]

This adjustment will be done in the open loop and closed loop modes.

<STEP 1>

OPEN LOOP MODE

1. 75% color bar alignment tape
2. SW2601 OPEN
3. AT menu Screen Options; CENTER/ENABLE
4. Variable X1 playback

<STEP 2>

1. SCOPE CH1 : TP2629
   SCOPE CH2 : TP2630
   (Strain Offset pots)
   VR2609
   VR2610
   (Strain Offset pots)

<STEP 3>

1. Adjust VR2609 &2610 ("STROSA" & "STROSB") for 0 volts at TP2629 & 2630.

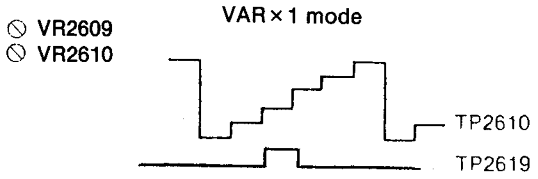
CLOSED LOOP MODE

<STEP 4>

1. Close the strain loop with SW2601.
2. Continue in Variable X1 playback.
3. While monitoring TP5006 & 5007, adjust the Strain Offsets VR2609 & 2610 for the voltages noted at in step (8-10).

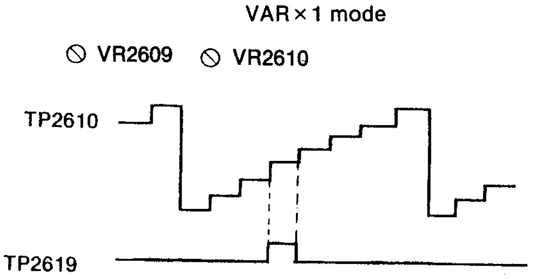
<STEP 5>

1. Now, fine adjust VR2609 & 2610 for three conditions;
   A). Proper rising stairstep and pulse timing at TP2610 & 2619. (The stairs are rising from left to right, there are 6 or 8 steps (for NTSC or PAL), and the pulse is aligned with the highest step.
   B). Maximum RF on the 4 "envelope" bar graphs on the Test/Servo/AT screen.
   C). Zero volts plus or minus 50 volts at test points 5006 & 5007.



SPECIFICATION: TP2619 pulse is located at the third step of TP2610

(NTSC)



SPECIFICATION: TP2619 pulse is located at the fourth step of TP2610

(PAL)

<STEP 6>

1. Repeat section 8-10, 8-11, until front panel envelope does not change when SW2601 is opened and closed.

GAIN ADJUSTMENT (S4 : AT)

SPEC	REFER TO FIGURE
TEST	TP2611[D1], TP2612[D1], TP2610[F1], TP2619 (TRIGGER [E1] TP5006 [C2],TP5007[C1] TP8 (S1) TP8 (S2) TP207 on REC Amp
MODE	VAR×1, FRAME STILL, SW2601 = CLOSE, H.A REGULATOR, P523 = ON, SEARCH = CENTER, PATTERN = ENABLE
TAPE	75% COLOR BAR PORTION ALIGNMENT TAPE
M.EQ	OSCILLOSCOPE
INPUT	
ADJ.	VR2611[G1], VR2612[H1]

<STEP 1>

1. AT Play "Frame" option on the SET UP/HOME screen or TEST/SERVO/AT screen.
2. CENTER/ENABLE on the Test/Servo/AT screen.
3. 75% color bar tape
4. Place the unit to STILL mode.
5. Set the AT head heights to zero from the front panel.

<STEP 2>

1. SCOPE CH1 : TP2610 Segment Pattern
   SCOPE CH2 : TP2619 Pulse
   VR2611 "STRGNA"
   VR2612 "STRGNB"

<STEP 3>

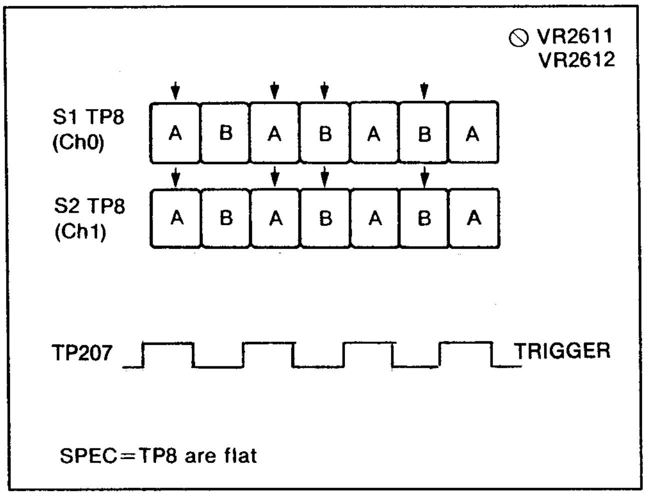
1. Adjust VR2611 & 2612 for Maximum RF level on the "envelope" bar graphs on the front panel while maintaining the proper timing relationship between the pulse and Segment waveforms, at the third step (NTSC), fourth step (PAL).
2. As a rough check, the voltage in the play mode should be approximately 0 volts at TP5006 & 5007, and the segment LED should be off.

<STEP 4>

1. Next, fine adjust the circuit as follows;
2. AT Play "Frame" on the SETUP/HOME screen or TEST/SERVO/AT screen.
3. CENTER/ENABLE
4. SW2601 CLOSED
5. Variable STILL mode (not play Still).

<STEP 5>

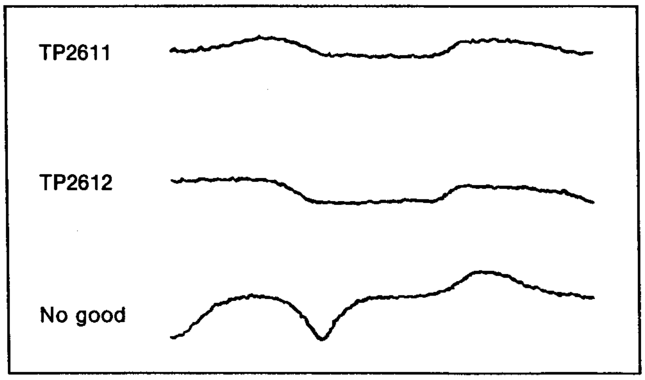
1. SCOPE CH1 : TP8 on the S1 board
   SCOPE CH2 : TP8 on the S2 board
   TP207 for triggering
   (on the REC Amp Board).
2. Fine adjust VR2611 & 2612 for flatness in the detected envelope, and maximum envelope level on the front panel meter.



SPEC=TP8 are flat

Note:

1. If output waveform of TP8 is not clear, connect the scope to CH1 to TP2611 and CH2 to TP2612 on the AT board.
2. Confirm that output DC level is flat.



STRAIN LOOP FREQUENCY RESPONSE ADJUSTMENT (S4 : AT)

SPEC	REFER TO FIGURE
TEST	TP2629[G1] --- A CH WFM OUT TP2630[H1] --- B CH (ENVELOPE) TP2619[E1] --- (H SW) TRIGGER,
MODE	VAR X1, -X1, SW2601=CLOSE, SEARCH=CENTER=PATTERN=ENABLE
TAPE	75% COLOR BAR PORTION ALIGNMENT TAPE
M.EQ	OSCILLOSCOPE
INPUT	Composite color bar to VIDEO IN
ADJ.	VR2619(TWN A)[H2], VR2621(LGN A)[H2] - A CH VR2620(TWN B)[H2], VR2622(LGN B)[H2] - B CH

<STEP 1>

1. SCOPE CH1 : WFM OUT (ENV pattern)
   CH2 : TP2619 (TRIG)
2. Set the each VRS as follows.
   VR2619, VR2620 : center position.
   VR2621, VR2622 : fully counterclockwise

<STEP 2>

1. Place the unit to VAR ×1 mode.
2. Set the AT height on the test menu to 1/3 level decrease (off track) from maximum envelope.
3. Slowly turn VR2619 and VR2620 to clockwise until output envelope waving is increase.
4. Adjust VR2619 and VR2620 to counterclockwise so that the output envelope waving is minimum.
5. Confirm that the SEGM lamp is OFF.
6. After confirmation, set the AT HEIGHT to 0.
7. Set the VR2621 and VR2622 to fully clockwise.

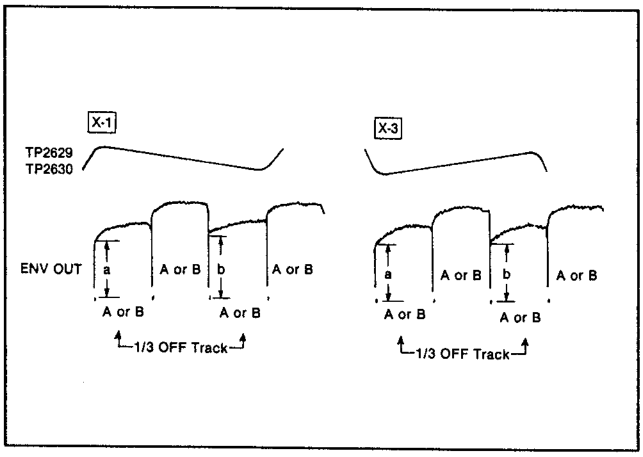
Note: Adjust each head (A, B) independently.

<STEP 3>

1. SCOPE CH1 : WFM OUT (ENV pattern)
   CH2 : TP2629, TP2630
   CH3 : TP2619 (TRIG)
2. Place the unit to VAR-X1 and VAR-X3.

<STEP 4>

1. Set the AT height on the test menu to 1/3 level decrease (off track) from maximum envelope.
2. Adjust VR2621 and VR2622 so that the droop of entrance side of output envelope is same level between a and b.



<STEP 5>

1. Confirm that the SEGM lamp is OFF.
2. After confirmation, set the AT HEIGHT to 0.

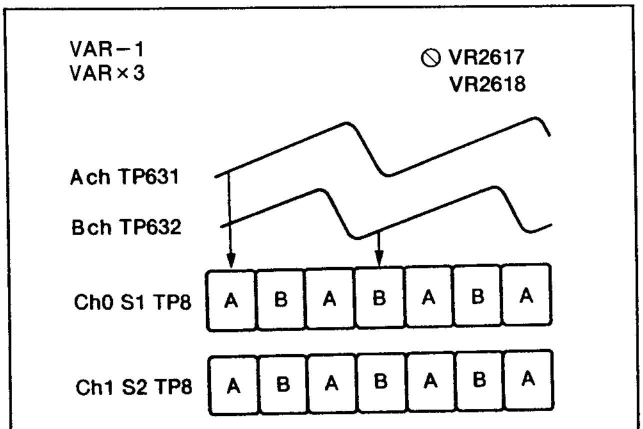
Note: Adjust each head (A, B) independently.

GROUP DELAY COMPENSATION ADJUSTMENT (S4 : AT)

SPEC	REFER TO FIGURE
TEST	TP8[E2]→S1, TP8[E2]→S2, TP631[H2]→S4 TP632[I3] → S4
MODE	VAR × -1, × 3 → VAR ×1 ~ ×-3
TAPE	75% COLOR BAR PORTION ALIGNMENT TAPE
M.EQ	OSCILLOSCOPE
INPUT	
ADJ.	VR2617[D1], VR2618[E1]

<STEP 1>

1. AT Play Frame or Field.
2. SCOPE CH1 : TP8 on the S1 board.
   SCOPE CH2 : TP8 on the S2 board.
   SCOPE CH3 : TP2631
   SCOPE CH4 : TP2632
3. Use the knob to activate the variable times 3 and variable times -1 modes, alternately.



SPEC=Center position between (1) and (2)

4. Confirm that the output waveform is flat as shown in figure.
5. If it is not, adjust VR2617 and VR2618.

PRE READ CONFIRMATION (S4 : AT)

SPEC	REFER TO FIGURE
TEST	TP2610[F1], TP2619[E1]
MODE	EDIT PLAY, SW2601-CLOSE, P523-ON AT TEST = NORMAL, PRE READ MODE
TAPE	75% COLOR BAR PORTION ALIGNMENT TAPE
M.EQ	OSCILLOSCOPE
INPUT	
ADJ.	CONFIRMATION ONLY

<STEP 1>

SCOPE CH1 : TP2610
SCOPE CH2 : TP2619

<STEP 2>

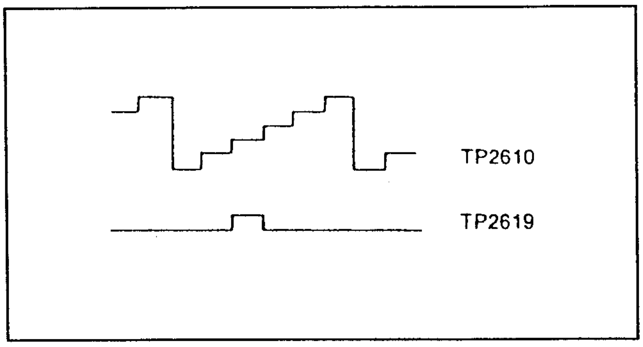
1. Set preread mode as follows.

   HOME MENU → F + F8 (PRE READ ON) → MANUAL EDIT MENU → F2 INSERT

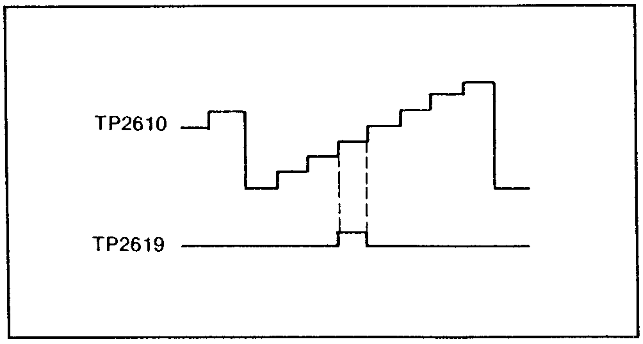
2. Playback the alignment tape.

<STEP 3>

Confirm the pulse at TP2619 is located at 4TH (PAL), 3RD (NTSC) steps of TP2610 as shown below.



(NTSC)



(PAL)

CONFIDENCE PB CONFIRMATION (S4 : AT)

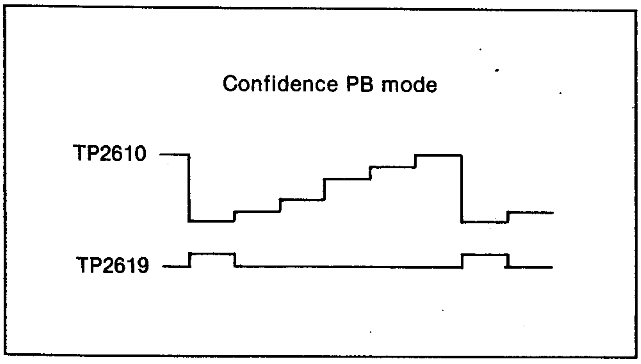
SPEC	REFER TO FIGURE
TEST	TP2610[F1], TP2619[E1]
MODE	CONFIDENCE PB HOME MODE, SW2601 = CLOSE
TAPE	BLANK TAPE
M.EQ	OSCILLOSCOPE
INPUT	
ADJ.	CONFIRMATION ONLY

<STEP 1>

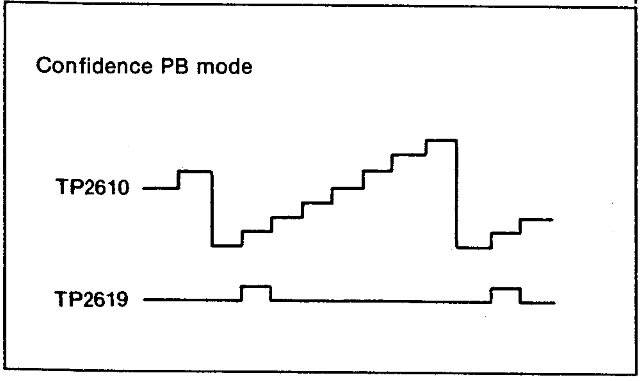
SCOPE CH1 : TP2610
SCOPE CH2 : TP2619

<STEP 2>

Confirm the pulse at TP2619 is located at first (NTSC) or Second (PAL) steps of TP2610 as shown below.


Confidence PB mode
TP2610
TP2619

NTSC


Confidence PB mode
TP2610
TP2619

PAL

FINAL CONFIRMATION OF AT ADJUSTMNET

SPEC	TP2619 PULSE IS LOCATED AS SHWON IN FIGURE
TEST	TP2611[D1], TP2612[D1], TP2610[F1], TP2619(TRIGGER)[E1], TP5006, TP5007 (H.A REGULATOR)
MODE	VAR, FRAME STILL, SW2601 = CLOSE, P523 = ON SEARCH = CENTER, PATTERN = ENABLE
TAPE	75% COLOR BAR POSITION ALIGNMENT TAPE
M.EQ	OSCILLOSCOPE
INPUT	
ADJ.	VR2609 (STR OS A),VR2610 (STR OS B)[H1] VR2611[G1], VR2612[H1]

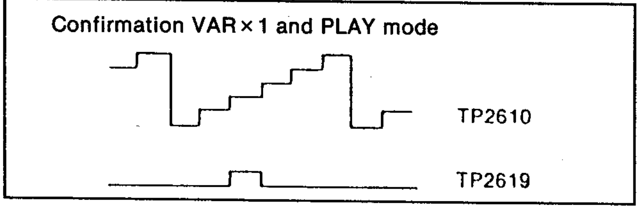
<STEP 1>

MACHINE CONDITION

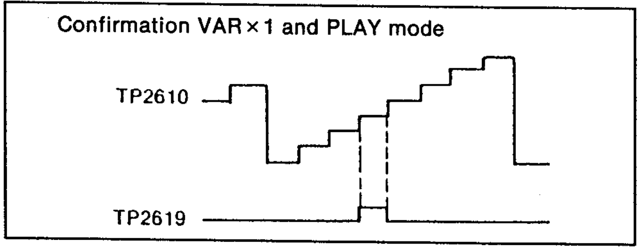
1. VAR X1, P523 = ON, SW2601 = CLOSE
2. Set the AT mode, SEARCH = CENTER, PATTERN = ENABLE
3. Set the AT HEIGHT on the front panel, both A CH and B CH are 0.

<STEP 2>

1. SCOPE CH1 : TP2610
   CH2 : TP2619
   CH3 : TP5006
   (H.A REGULATOR Board)
   CH4 : TP5007
   (H.A REGULRATOR Board)
2. Confirm the waveform is as shown in Figure.
   If it is not, adjust VR2609 and VR2610.
3. Confirm that the DC voltage is 0 ± 50V DC.
4. Confirm that the envelope output is maximum on the front display.
5. If it is not Readjust VR2609 and VR2610. (Refer to item 8-11 AT HEIGHT (2) ADJUSTMENT)


Confirmation VAR×1 and PLAY mode
TP2610
TP2619

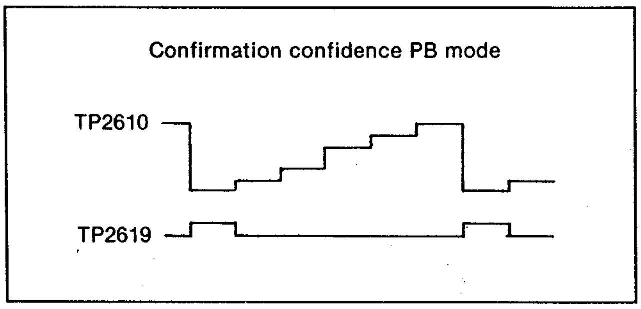
(NTSC)


Confirmation VAR×1 and PLAY mode
TP2610
TP2619

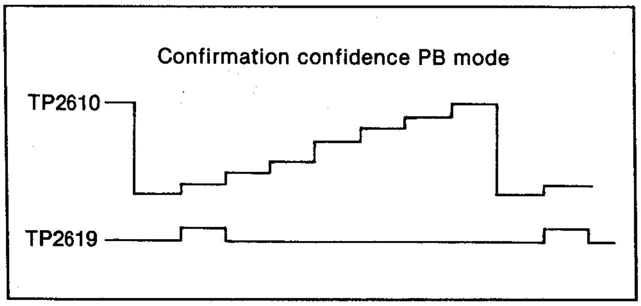
(PAL)

<STEP 3>
1. Set the AT mode to NORMAL (F1).
2. Place the unit in the PLAY mode.
3. Confirm the waveform is as shown in figure.

<STEP 4>
1. Place the unit in the Recording mode.
2. Confirm the waveform is as shown in figure.


Confirmation confidence PB mode
TP2610
TP2619

(NTSC)


Confirmation confidence PB mode
TP2610
TP2619

(PAL)

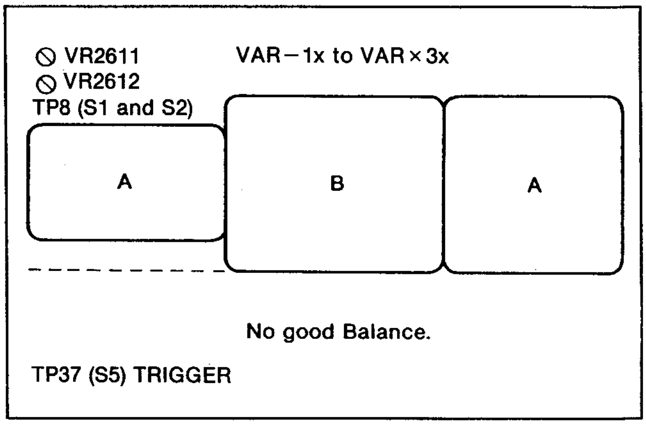
3. If it is not, readjust VR2609 and VR2610. (Refer to item 8-11 AT HEIGHT (2) adjustment)

Note: If the segment steps is matched the pulse and segment, Segment LED is OFF.

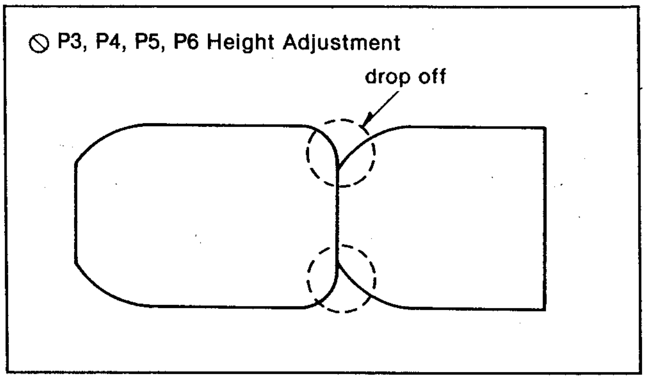
<STEP 5>
1. SCOPE CH1 : TP8(S1) on the Equalizer Board.
   SCOPE CH2 : TP8(S2) on the Equalizer Board.
   SCOPE CH3 : TP37(S5) on the SERVO Board. (for trigger)
2. Confirm that the envelope is flat from VAR X-1 to VAR X3. And check the CH A and CH B envelope output balance.

Note: If the envelope drop off at entrance side and exit side, in this case re-check the tape pass linearity. (Refer to P3 or P6 Height adjustment)

3. If it is not, readjust VR2611 and VR2612 (Refer to item 8-15 GAIN adjustment).


⊘ VR2611
⊘ VR2612
VAR−1x to VAR×3x
TP8 (S1 and S2)
A
B
A
No good Balance.
TP37 (S5) TRIGGER

8-12 GAIN ADJUSTMENT


⊘ P3, P4, P5, P6 Height Adjustment
drop off

EQUALIZER CH0 (S1) BOARD
EQUALIZER CH1 (S2) BOARD

Adjustment procedures of S1 and S2 are same, so both boards adjustment procedures are explained together.

Set The SW51 Line and Field shuffle on the L2 board to OFF as shown in Figure 1.

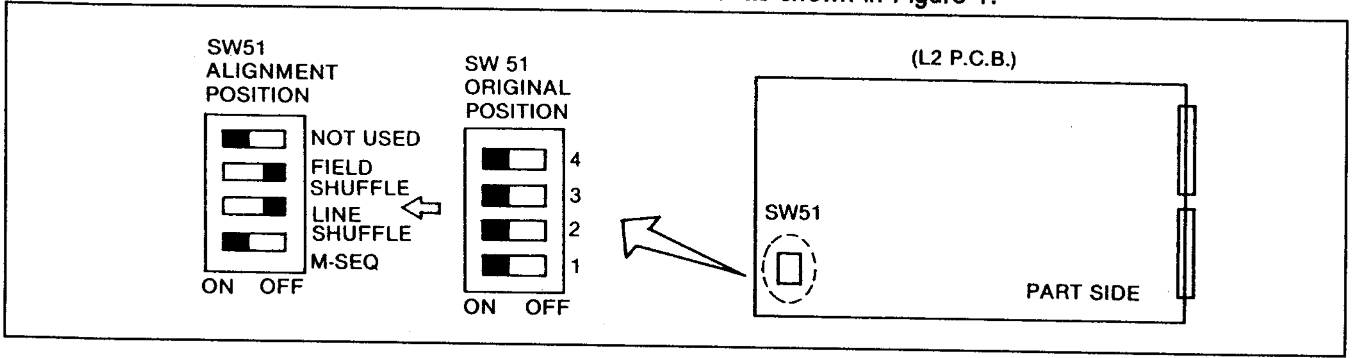
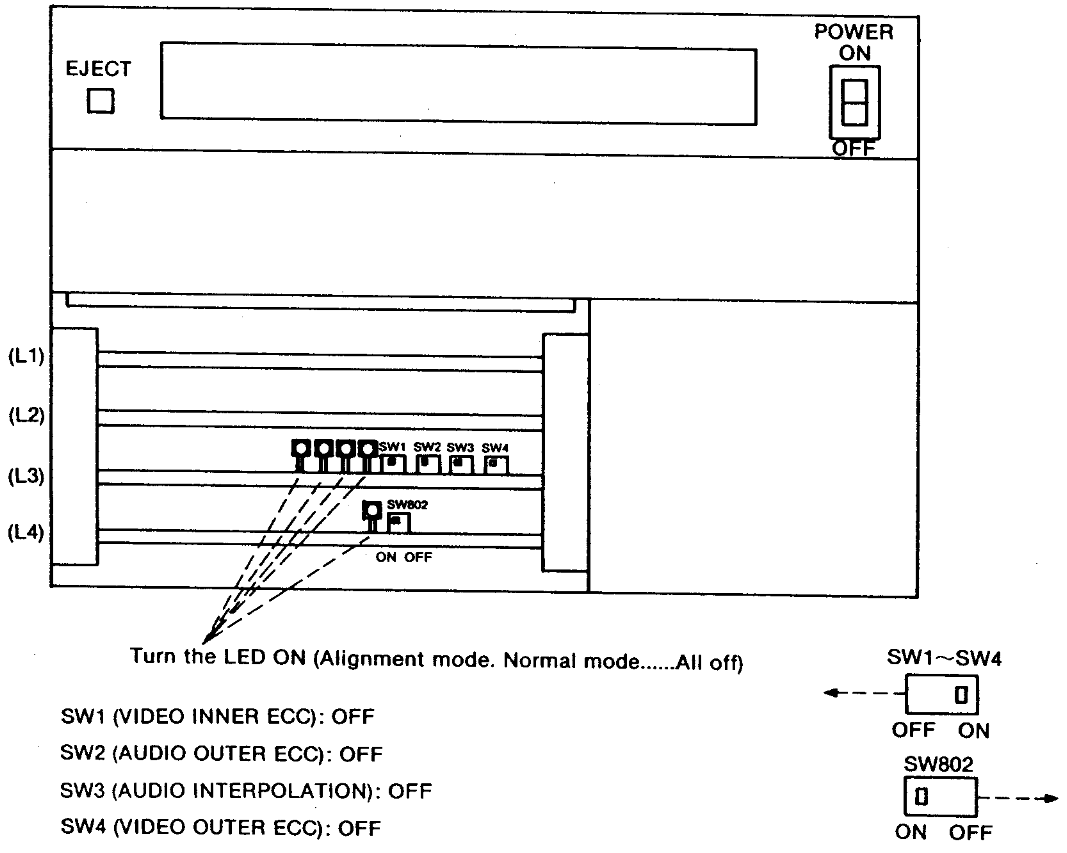

SW51
ALIGNMENT
POSITION
NOT USED
FIELD
SHUFFLE
LINE
SHUFFLE
M-SEQ
ON OFF
SW 51
ORIGINAL
POSITION
4
3
2
1
ON OFF
(L2 P.C.B.)
SW51
PART SIDE

Figure 1.

1. Set the SW1, 2, 3 and 4 on the L3 P.C.B. follow the Figure 2.
2. Set the SW802 on the L4 P.C.B. follow the Figure 2.
3. Confirm that the 3 LED's are turned ON.


EJECT
POWER
ON
OFF
(L1)
(L2)
(L3)
(L4)
SW1 SW2 SW3 SW4
SW802
ON OFF
SW1~SW4
OFF ON
SW802
ON OFF

Turn the LED ON (Alignment mode. Normal mode......All off)

SW1 (VIDEO INNER ECC): OFF

SW2 (AUDIO OUTER ECC): OFF

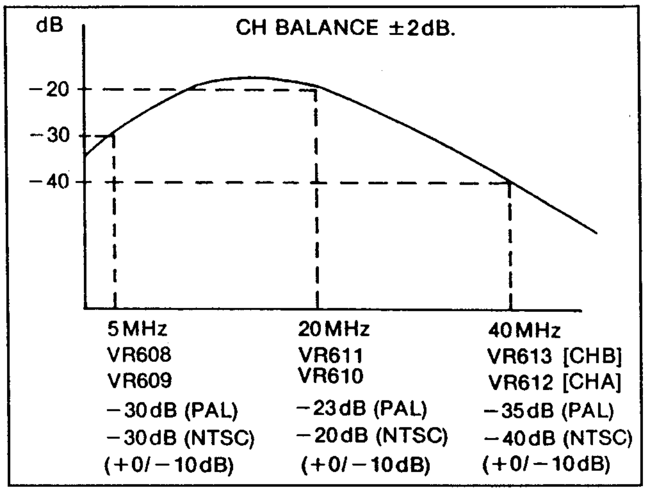
SW3 (AUDIO INTERPOLATION): OFF

SW4 (VIDEO OUTER ECC): OFF

SW802 (CONCEAL ECC): OFF

Figure 2

EQUALIZATION ADJUSTMENT (1)
(S1 : REC/PLAY CH0)
(S2 : REC/PLAY CH1)



Factory Preset only, skip this item after Head Replacement.

SPEC	
TEST	TP8[E2], VIDEO OUT, TP400[F4]
MODE	VAR (× 1)
TAPE	SHUFFLING OFF 75% COLOR BAR ALIGNMENT TAPE
M.EQ	SPECTRUM ANALYZER
INPUT	
ADJ.	See Below

5000 SERIES

<STEP 1>

Adjustment VR.

(1) VR3 (PHASE SHIFT) -------6 division
(2) VR609 (MAG A) ------------7 division
  VR608 (MAG B) ------------7 division
(3) VR613 (AFC HA) -----------5 division
  VR612 (AFC HB) -----------5 division
(4) VR611 (AFC MA) -----------2 division
  VR610 (AFC MB) -----------2 division

<STEP 2>

1. Set the spectrum analyzer to REG 4 mode.

REG 4 mode

	ITEM	**PARAMETER**
(1)	REF LEVEL	-10.0dBm
(2)	ATTEN	10dB
(3)	DIV (dB/DIV)	5dB/div
(4)	START FREQUENCY	0MHz
(5)	STOP FREQUENCY	50MHz
(6)	RES BW	1MHz
(7)	VIDEO BW	3kHz
(8)	SWEEP TIME	300msec
(9)	TRIGGER	EXT (HEAD SW)
(10)	VID AVG	10

<STEP 3>

EQUALIZER COARSE ADJUSTMENT

1. Connect the spectrum analyzer to TP8.
2. Connect the EXT Trigger input of the spectrum analyzer to TP400 (HEAD SW).
3. Adjust VR609 (MAG A) and VR608 (MAG B) so that the gain is -30dB +0/-10dB at 5MHz portion.
4. Adjust VR613 (AFC HA) and VR612 (AFC HB) so that the gain is -35dB +0/-10dB at 40MHz portion.
5. Adjust VR611 (AFC MA) and VR610 (AFC MB) so that the gain is -23dB +0/-10dB at 20MHz portion.

Note: If still out of specification.
Just adjust as A curve as shown in Figure.
And then carry on next the adjustment.

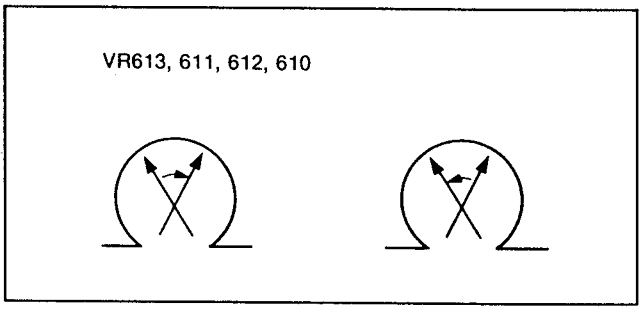
EQUALIZATION ADJUSTMENT (2)
(S1 : REC/PLAY CH0)
(S2 : REC/PLAY CH1)

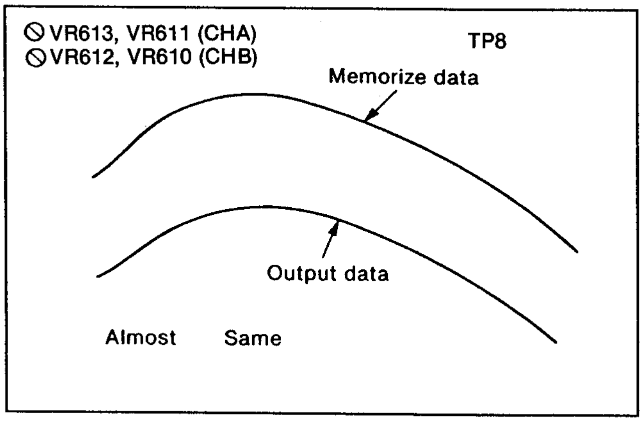
SPEC	MINIMUM ERROR RATE
TEST	TV MONITOR, FRONT ERROR DISPLAY
MODE	VAR (× 1)
TAPE	SHUFFLING OFF 75% COLOR BAR ALIGNMENT
M.EQ	SPECTRUM ANALYZER
INPUT	
ADJ.	VR611 (AFC MA)[F1], VR610 (AFC MB)[F1], VR613 (AFC HA)[E1], VR612 (AFC HB)[E1], VR10 (COMP BIAS LEVEL)[F1], VC301 (PHASE ADJ)[A2], VC1 (RESON A)[G2], VC2 (RESON B)[G2], VR3 (PHASE SHIFT)[I2] VR608(MAG B), VR609(MAG A), [D1] VR11 (AUTO EQ IN LEVEL) [E1] VR12 (AFC MATCH) [F4] ~~5000 SERIES~~

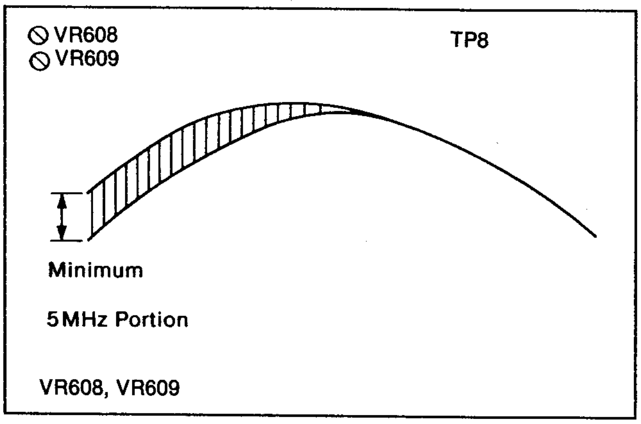
[RF SECTION]

<STEP 1>

1. Use the "75% Color Bars Shuffle OFF" tape.
2. Search = "CENTER"
   Maximize the envelope bar graphs on the front panel by adjusting the AT heights in the SUPER USER Menu.
3. Choose "PB mode : ch0" on the SUPER USER MENU when adjusting the Equalizer CH0 board, and "PB mode : ch1" for the CH1 board at the same time video output picture must be stable.
4. Center VC1/VC2.
5. Use VR3/VR10/VC301 to minimize errors (speckling) on the picture monitor. Continue adjusting these three pots until no further improvement is possible.
6. Use VC1, VC2 & VR3 to further reduce the errors.
7. Use VC1, VC2 & VR10 in the same manner.
8. Adjust VC301 to minimize screen errors and adjust VR12 to minimize screen errors.
9. Change the ECC Sample on the TEST/RF Menu to fast
10. Memorize the spectrum waveform on TP8 into the "B" memory of the HP8591A Spectrum Analyzer.
11. Next adjust VR613 & 611 to reduce the error rate further. Turn VR613 very slightly in the direction which reduces the INNER ERROR RATE in the "CH0 A" bar graph. Then adjust VR611 very slightly in the opposite direction CCW to reduce the error further. Continue this alternate adjustment of the pots until no more improvement is possible.
12. Repeat this same adjustment technique starting with VR612 and following with VR610, in order to minimize the INNER ERROR RATE on the "CH0 B" bar graph.
13. Recall the previously memorized waveform in the Spectrum Analyzer "B" memory, and compare it to the waveform now present on TP8. If the two waveforms aren't similar in appearance, adjust the two pairs of pots 613/611 (CHA) & 612/610 (CHB) in the manner described above, for minimum error rate for both heads, and similar spectrum waveshapes.
14. Adjust VR608 & 609 to minimize the "sawtooth" appearance of the spectrum waveform at the 5Mhz end.
15. Adjust VR10 & VC301 to further reduce the Inner Error Rate.

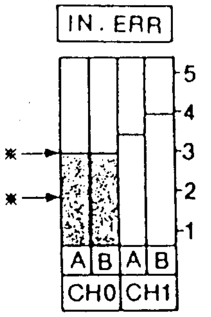






16. Confirm the error rate is less than 10-4 (scale 3).

⊘ CONFIRMATION



TYPICAL VALUE: Error rate is less than scale 3.

Note: After equalization adjustment, RF envelope output level adjustment is required as follows.

1. Connect the scope to TP8 and place the unit in PLAY mode.
2. Adjust VR608 abd VR609 so that the output envelope is 400mVp-p. (50Ω terminated).
3. Connect the scope to WFM out and adjust VR11 so that the output envelope is 200mVp-p (75Ω terminated).

REC CURRENT and REC EQUALIZER ADJUSTMENT (CH0)(REC AMP)

SPEC	REFER TO FIGURE
TEST	TP8 (S1 BOARD), TP207 (REC AMP BOARD) → EXT IN
MODE	PLAY → REC
TAPE	75% COLOR BAR ALIGNMENT TAPE SELF RECORDING TAPE
M.EQ	SPECTRUM ANALYZER, 50Ω PROBE WITH CLIP
INPUT	SHUFFLING OFF 75% COLOR BAR ALIGNMENT TAPE
ADJ.	FRONT PANEL REC CURRENT (S MENU) VR2 (CH0 A FREQ), VR4 (CH0 B FREQ)

<STEP 1>

Set the spectrum analyzer as follows.

(REG 4)

REFERENCE LEVEL	:	-10.0dBm
ATTEN	:	10dB
DIV (dB/DIV)	:	5dB/div
START FREQUENCY	:	0Hz
STOP FREQUENCY	:	50MHz
RES BW	:	1MHz
VIDEO BW	:	3kHz
SWEEP TIME	:	300m sec
TRIGGER	:	EXT(HEAD SW)

<STEP 2>

Set the VTR shuffling off, error correction off and error concealment off mode.

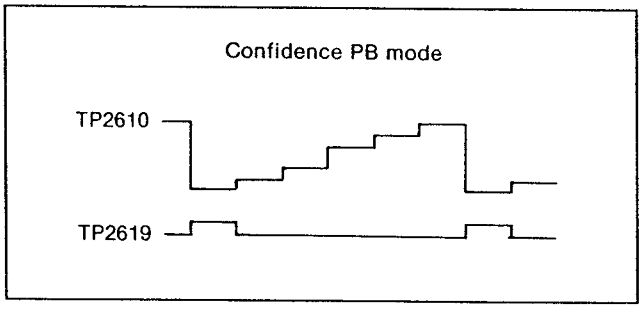
L2 SW51-2 (OFF), SW51-3 (OFF)
L3 SW1 (OFF), SW2 (OFF), SW3 (OFF), SW4 (OFF)
L4 SW802 (OFF)

<STEP 3>

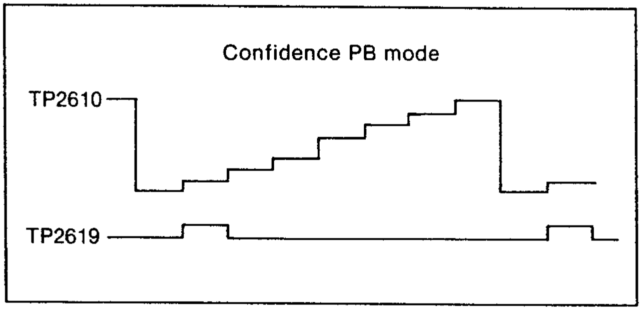
1. Connect the spectrum analyzer probe to TP8 on S1 Board.
2. Playback a Shuffling off 75% color bar alignment tape.

<STEP 4>

1. SCOPE CH1 : TP2610 (S4)
   SCOPE CH2 : TP2619 (S4)
2. Set the machine condition as follows.
   VIDEO OUT → SET UP → STATE →
   [ ](CURSOR CENTER)
   [→] → [→] → [→](EDIT REC) → TAPE → MANUAL EDIT → INSERT
3. Set the VTR PLAY mode.
4. Confirm that the waveform is shown below and the envelope level on the front panel bar graph becomes maximum.
   If not, adjust Front Panel adjustment knob so that the these two conditions will be satisfied.
   TEST → SERVO → AT → F4(CENTER) → EXIT → EXIT RF → AT HEIGHT (F7) → BS+F8 → [ ](CURSOR CENTER) → F+[←]
   A and B Heads are selected by cusor key [←] [→].



(NTSC)



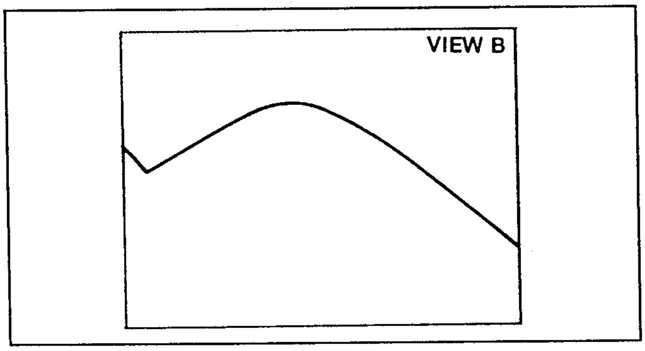
(PAL)

Note: This AT HEIGHT adjustment is tentative adjustment to get maximum envelope in correct AT Trace. Actual AT Adjustment must be done in AT (S4) Adjustment.

<STEP 5>

1. Memorize the frequency characteristics waveform to VIEW B of the spectrum analyzer.
2. Set the machine condition as follows.
   MANUAL EDIT → INSERT(INSERT OFF mode).

Note: STEP 4 and 5 place the AT Heads in the confidence position, when in Playback mode. The frequency characteristics can then be memorized and compared to the Rec frequency characteristics.

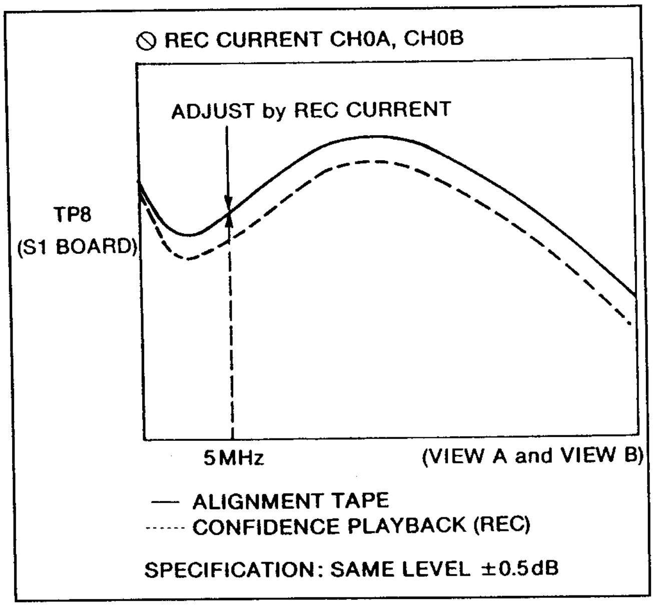


<STEP 6>

1. Eject the alignment tape and insert a self recording tape.
2. Connect the spectrum analyzer probe to TP8 on S1 Board.
3. Set the VTR in Rec mode.
4. Make sure that the AT Head height is correct position to get maximum envelope on CH0 display.
5. Set the FRONT MENU to REC CURRENT mode.
   TEST → RF → F4(REC CURRENT) → BS+F8 → [ ] (CURSOR CENTER) → F+[←]
   CH0 A, CH0 B, CH1 A, CH1 B Heads are selected by cursor key [↑] [↓].
6. Confirm that envelope on the bar graph is still keeping maximum level. If not, back to AT-HEIGHT adjusting menu and readjust Front Panel adjusting knob to get maximum level of envelope.
7. Set spectrum analyzer to REG 5. (refer to set up chart).

<STEP 7>

Adjust the REC Current CH0 A and CH0 B so that the waveform level is same level with the alignment tape play level at 5MHz.

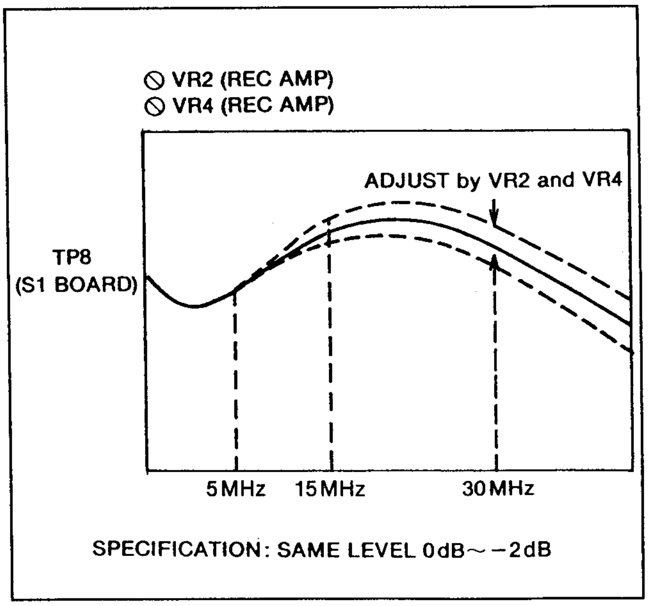


<STEP 8>

1. CH0B Rec Current Adjustment is same as CH0A which is described STEP 6-3 ~ STEP 7. (Just change the CH).

<STEP 9>

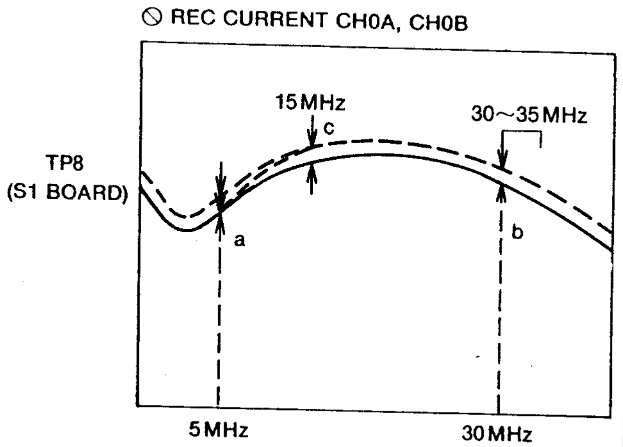
1. Adjust VR2 (CH0 A) and VR4 (CH0 B) so that the waveform level is same at 30MHZ as shown below and confirm that the error rate on the front panel is minimum.
2. If it is not, set the CH0 B to -128 by using adjustment VR on the front panel. And adjust VR2 (CH0 A) so that the error rate is minimum and same level.
3. Adjust VR4 (CH0 B) so that the error rate is minimum by using the same method above.



<STEP 10>

1. If level is increased at 30MHz to 35MHz, adjust REC CURRENT CH0 A and CH0 B so that the output level at 5MHz is same level. (A:0).
2. If the level is increased at 5MHz, adjust REC CURRENT CH0 A and CH0 B so that the output level at 5MHz is same increasing value. (a:c).

Caution: Adjustment point of VR2 and VR4 are as shown below.



SPECIFICATION: 1) b>O A=O
2) c>O A=C
O=PB level

<STEP 11>

1. Set the machine condition as follows.
   VIDEO OUT → SET UP → STATE → [ ]
   (CURSOR CENTER)
   [→] → [→] → [→](EDIT REC) → TAPE →
   MANUAL EDIT → INSERT
2. Set the VTR PLAY mode.
3. Confirm that the waveform level is same and error rate is minimum.

<STEP 12>

Set the AT HEIGHT Front Menu to all 0.

REC CURRENT and REC EQUALIZER ADJUSTMENT (CH1)(REC AMP)

SPEC	REFER TO FIGURE
TEST	TP8(S2 BOARD), TP207(S2 BOARD) → EXT IN
MODE	PLAY → REC
TAPE	75% COLOR BAR ALIGNMENT TAPE SELF RECORDING TAPE
M.EQ	SPECTRUM ANALYZER, 50Ω PROBE WITH CLIP
INPUT	SHUFFLING OFF 75% COLOR BARALIGNMENT TAPE
ADJ.	FRONT PANEL REC CURRENT (SP MENU) VR7 (CH1 A FREQ), VR9 (CH1 B FREQ)

<STEP 1>

Set the spectrum analyzer as follows.
(REG 4)

REFERENCE LEVEL	:	-10.0dBm
ATTEN	:	10dB
DIV (dB/DIV)	:	5dB/div
START FREQUENCY	:	0Hz
STOP FREQUENCY	:	50MHz
RES BW	:	1MHz
VIDEO BW	:	3kHz
SWEEP TIME	:	300m sec
TRIGGER	:	EXT (HEAD SW)

<STEP 2>

Set the VTR shuffling off, error correction off and error concealment off mode.

L2 SW51-2 (OFF), SW51-3 (OFF)
L3 SW1 (OFF), SW2 (OFF), SW3 (OFF), SW4 (OFF)
L4 SW802 (OFF)

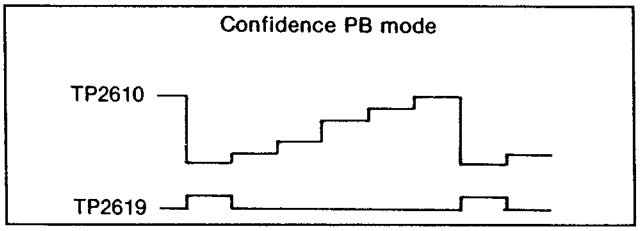
<STEP 3>

1. Connect the spectrum analyzer probe to TP8 on S2 Board.
2. Playback a Shuffling off 75% color bar alignment tape.

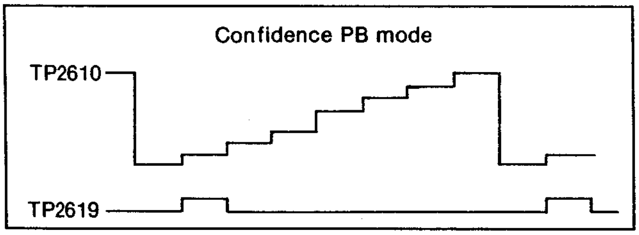
<STEP 4>

1. SCOPE CH1 : TP2610 (S4)
   SCOPE CH2 : TP2619 (S4)
2. Set the machine condition as follows.
   (This setting is for the AT Heads in confidence position)
   VIDEO OUT → SET UP → STATE → [ ]
   (CURSOR CENTER)
   [→] → [→] → [→](EDIT REC) →
   TAPE → MANUAL EDIT → INSERT

3. Set the VTR PLAY mode.
4. Confirm that the waveform is shown below and the envelope level on the front panel bar graph becomes maximum.
   If not, adjust Front Panel adjustment knob so that the these two conditions will be satisfied.
   TEST → SERVO → AT → F4(CENTER) → EXIT → EXIT → RF → AT HEIGHT → BS+F8 → [ ] (CURSOR CENTER) → F+[←]
   A and B Heads are selected by cusor key [←] [→].



(NTSC)



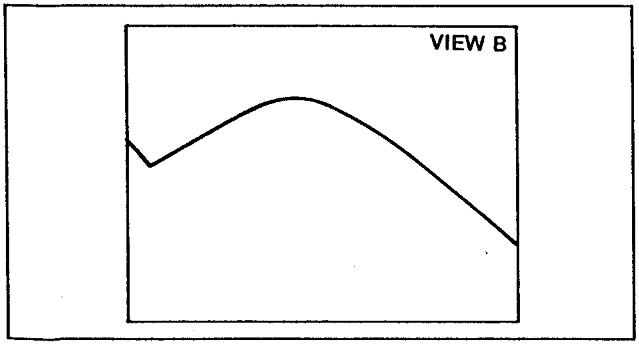
(PAL)

Note: This AT HEIGHT adjustment is tentative adjustment to get maximum envelope in correct AT Trace. Actual AT Adjustment must be done in AT (S4) Adjustment.

<STEP 5>

1. Memorize the frequency characteristics waveform to VIEW B of the spectrum analyzer.
2. Set the machine condition as follows.
   MANUAL EDIT → INSERT (INSERT OFF mode).

Note: STEP 4 and 5 is place the AT Heads in the confidence position, when in Playback mode. The frequency characteristics can be memorized and compared to the Rec frequency characteristics.

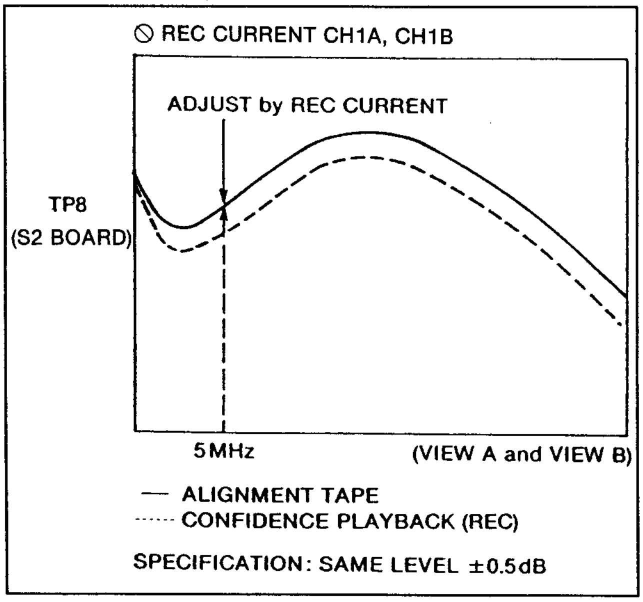


<STEP 6>

1. Eject the alignment tape and insert a self recording tape.
2. Connect the spectrum analyzer probe to TP8 on S2 Board.
3. Set the VTR in Rec mode.
4. Make sure that the AT Head height is correct position. to get maximum envelope on CH1 display.
5. Set the FRONT MENU to REC CURRENT mode.
   TEST → RF → F4(REC CURRENT) → BS+F8 → [ ] (CURSOR CENTER) → F+[←]
   CH0 A, CH0 B, CH1 A, CH1 B Heads are selected by cursor key [↑] [↓].
6. Confirm that envelope on the bar graph is still keeping maximum level. If not, back to AT-HEIGHT adjusting menu and readjust Front Panel adjusting knob to get maximum level of envelope.
7. Set spectrum analyzer to REG 5. (refer to set up chart).

<STEP 7>

Adjust the REC Current CH1 A and CH1 B so that the waveform level is same level with the alignment tape play level at 5MHz.

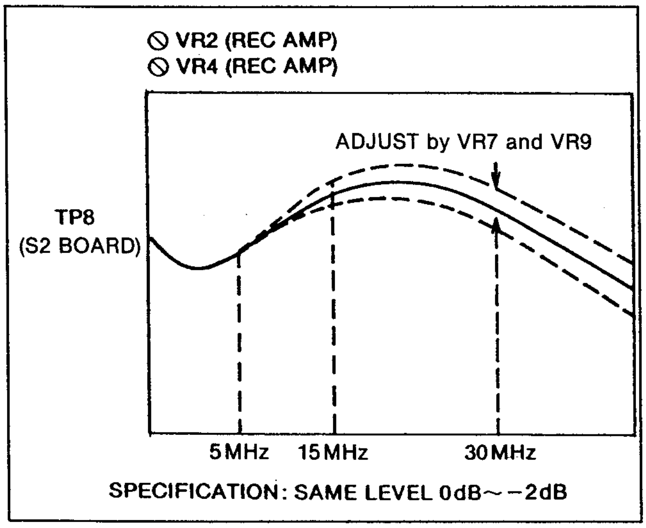


<STEP 8>

1. CH1B Rec Current Adjustment is same as CH1A which is described STEP 6-3 ~ STEP 7 (Just change the CH).

<STEP 9>

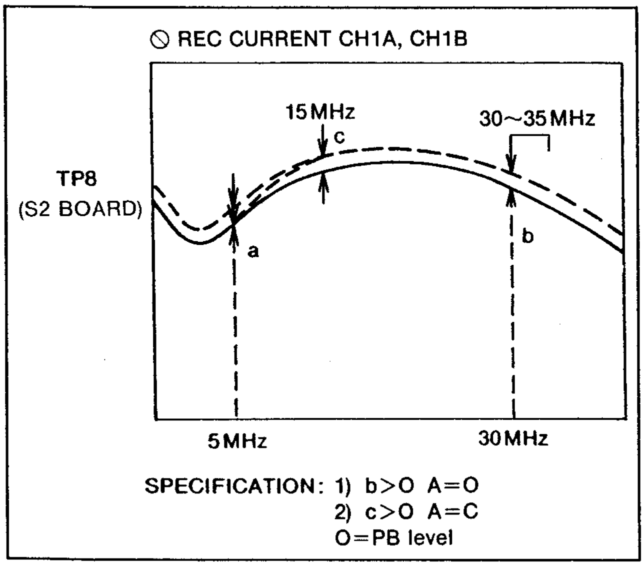
1. Adjust VR7 (CH1 A) and VR9 (CH1 B) so that the waveform level is same at 30MHZ as shown below and confirm that the error rate on the front panel is minimum.
2. If it is not, set the CH1 B to -128 by using adjustment VR on the front panel. And adjust VR7 (CH1 A) so that the error rate is minimum and same level.
3. Adjust VR9 (CH1 B) so that the error rate is minimum by using the same method above.


⊘ VR2 (REC AMP)
⊘ VR4 (REC AMP)
ADJUST by VR7 and VR9
TP8
(S2 BOARD)
5MHz
15MHz
30MHz
SPECIFICATION: SAME LEVEL 0dB~-2dB

<STEP 10>

1. If level is increased at 30MHz to 35MHz, adjust REC CURRENT CH1 A and CH1 B so that the output level at 5MHz is same level. (A:0).
2. If the level is increased at 5MHz, adjust REC CURRENT CH1 A and CH1 B so that the output level at 5MHz is same increasing value. (a:c).

Caution: Adjust point of VR7 and VR9 are as shown below.


⊘ REC CURRENT CH1A, CH1B
15MHz
c
30~35MHz
TP8
(S2 BOARD)
a
b
5MHz
30MHz
SPECIFICATION: 1) b>O A=O
2) c>O A=C
O=PB level

<STEP 11>

1. Set the machine condition as follows.
   VIDEO OUT → SET UP → STATE → [ ]
   (CURSOR CENTER)
   [→] → [→] → [→](EDIT REC) → TAPE →
   MANUAL EDIT → INSERT
2. Set the VTR PLAY mode.
3. Confirm that the waveform level is same and error rate is minimum.

<STEP 12>

Set the AT HEIGHT Front Menu to all 0.

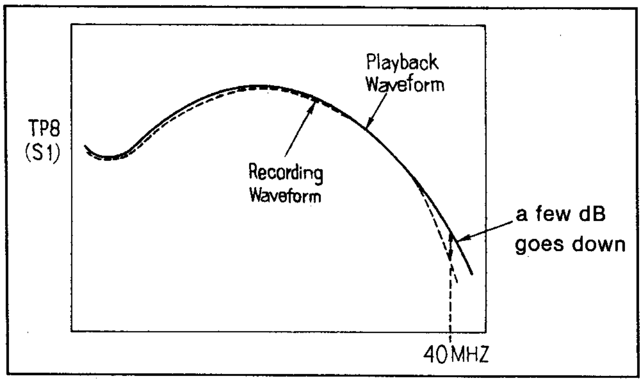
<STEP 13>

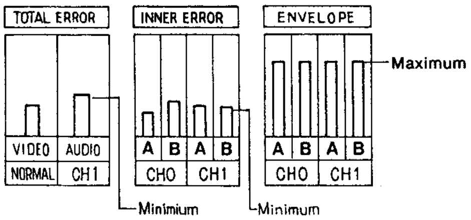
1. Save the REC CURRENT DATA as follows TEST MENU.
   BS + F8 → F9 (Select USER) → F + F11(SAVE)

Note: When save the data, REC CURRENT data display will be disappeared.

Simplified Adjustment Procedure (INFORMATION)

1. Insert a cassette and place the unit in recording mode.
2. Set the machine condition as follows.
   TEST→RF→REC CURR→[ ](CURSOR CENTER) → [→] → (REC CURR).
   CH0 A, CH0 B CH1 A or CH1 B Heads are selected by cursor key [↑] [↓].
3. Adjust each CH by using the adjustment VR on the front panel so that the output envelope is maximum and minimum error on the display.
   * In confidence mode, if adjust CH0 A, change the CH0 B envelope output. (CHA recording, CHB playback in confidence mode).
4. Adjust VR2, VR4, VR7 and VR9 on the REC AMP board so that the error rate is minimum.
5. After this adjustment check the frequency characteristics waveforms by using the spectrum analyzer. Refer to the item 14-2 and 14-3.
6. This specification is minimum error rate. (Inner Error rate is less than 4 on the display bar.)
7. If out of specification check the frequency characteristic waveform by using the spectrum analyzer. Connect the spectrum analyzer to TP8 on the S1 board and play back the alignment tape (1) and memorize the frequency characteristic waveform.
8. After memorize, place the unit in the recording mode.
9. If output waveform is same as the playback waveform, readjust the VR612 and VR613 so that the output level goes down a few dB level around 40MHz portion and minimum error rate as shown in Figure.


TP8
(S1)
Playback
Waveform
Recording
Waveform
a few dB
goes down
40MHZ



REC CURRENT	
CH0A	+ 110
CH0B	− 120
CH1B	+ 53
CH1A	+ 52

RF2 ENVELOPE DETECTION ADJUSTMENT

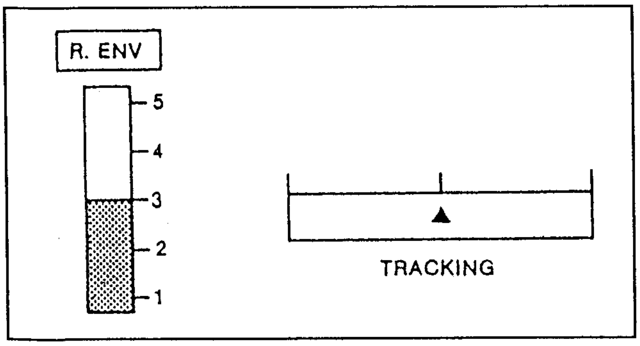
SPEC	MAX. ENVELOPE ON FRONT METER
TEST	FRONT METER OF TEST RF MENU
MODE	PLAY
TAPE	COLOR BAR SECTION OF ALIGNMENT TAPE
M.EQ	400MHz OSCILLOSCOPE
INPUT	
ADJ.	VR10[B3](CH1 OFF), VR12[B3](CH1 GAIN) VR5 [F1], VR11 [G1]

<STEP 1>

1. Set VR11 to center position.
2. SCOPE CH1 : TP1
   CH2 : TP207 for Trigger
3. Adjust VR5 so that the DC voltage is 1.5V ± 0.1V.

<STEP 2>

1. Turn the VR10 fully clockwise.
2. Playback the alignment tape color bar portion.
3. Set the tracking FIX mode.
   TEST → RF → TRACKING → FIX
4. Adjust VR12 so that the envelope meter shows 3.0 as shown in figure.
5. Set the tracking variable mode.
   TEST → RF → TRACKING → VAR
   Confirm the envelope meter value is changed when the front panel adjustment VR is turned.



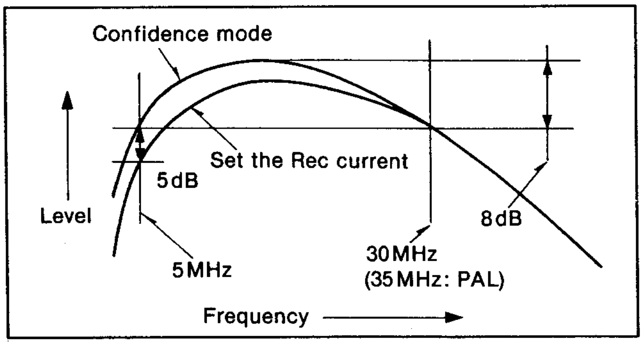
FINAL CONFIRMATION

SPEC	REFER TO FIGURE
TEST	TP8(S1,S2 BOARD), TP207(REC AMP BOARD) → EXT IN
MODE	REC mode
TAPE	SELF RECORDING TAPE
M.EQ	SPECTRUM ANALYZER, 50Ω PROBE WITH CLIP
INPUT	75% COLOR BAR SHUFFLING OFF ALIGNMENT TAPE
ADJ.	FRONT PANEL REC CURRENT (SP MENU) VR2, VR4, VR7, VR9

1. Set the spectrum analyzer REG 4 (refer to SET UP chart).
2. Connect the spectrum analyzer to TP8.
3. Connect the EXT input of spectrum analyzer to TP207.
4. Place the unit in the recording mode and memorize the frequency characteristics waveform to VIEW B of the spectrum analyzer.
5. Set the Rec current of front panel so that the output spectrum of 5MHz goes down to -5dB.
6. Confirm that the output spectrum as shown in figure.
7. If it is not, readjust the Rec current of front panel and VR2, VR4, VR7 and VR9.

MIX point of Both Spectrum = 30MHz ± 3MHz (NTSC)
35MHz → 3MHz (PAL)

8. Confirm that the error rate is minimum and envelope is maximum at bar graph.



TOTAL CONFIRMATION AFTER CENTER DRUM REPLACEMENT

1. ERROR RATE CONFIRMATION

* Set the following SWs to OFF position.

- SW51-1~4 (on L2 Board) Line and Field Shuffle SW
- SW1~4 (on L3 Board) Video / Audio ECC SW
- SW802 (on L4 Board) Video Conceal SW

1-1. MASTER TAPE PLAYBACK

1. Open the TEST → RF menu.
2. Playback the Alignment Tape No.1 (color bar Shuffling On portion).
3. Confirm that the TOTAL ERROR RATE display is,
   NTSC: Less than 2.0
   PAL: Less than 2.5

1-2. SELF REC / PLAYBACK

1. Make a recording few minutes.
2. Playback the just recorded portion.
3. Confirm that the TOTAL ERROR RATE display is,
   NTSC: Less than 2.0
   PAL: Less than 2.5

1-3. CONFIDENCE PLAYBACK

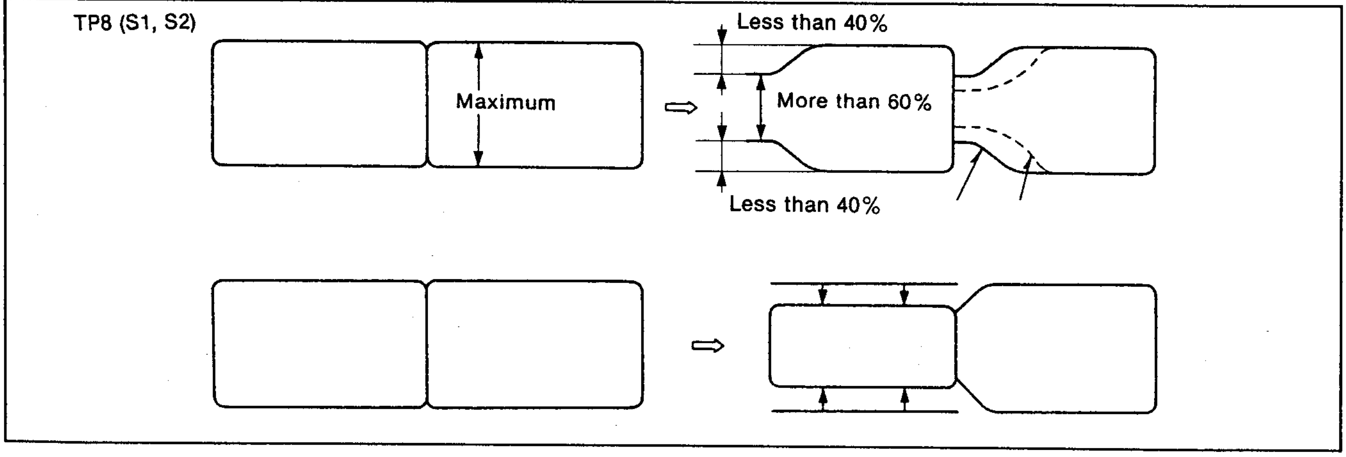
1. Set the SW51 (on L2 Board), SW1~4 (on L3 Board) and SW802 (on L4 Board) to ON position.
2. Set the confidence PB mode as follows.
   VIDEO OUT → F10 (STATE) → [ ] CENTER CURSOR → REC → TAPE
3. Make a recording and confirm that the TOTAL ERROR RATE does not displayed for about 1 minute.

2. AT PLAY CONFIRMATION

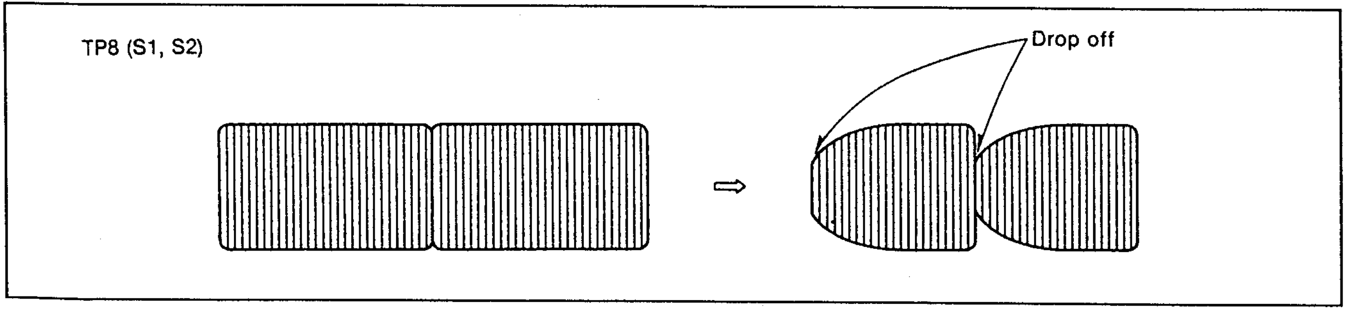
TEST POINT: TP8 (S1,S2).......... AT Envelope
TP400 (S1,S2)...... H SW for Trigger

TAPE USE: Alignment Tape No.1 (Color Bar Portion)

1. Set the VTR to VAR × -1 and VAR × 3 alternately.
2. Confirm that the entrance side and exit side of output envelope doesn't droop more than 40% from the maximum point. If droop more than 40% readjust the P3 post height and P6 post height.



3. Set the VTR to VAR × -1 and press the play button alternately.
4. Confirm that the output envelope do not drop off at the entrance side and exit side.



* If adjust the P3 or P6 post, tape pass linearity reconfirmation is necessary.

3. INSERT EDIT CONFIRMATION

TEST POINT: AUDIO OUT CH1/CH3
Error Rate Display

INPUT SIGNAL: Video/Audio Signal (Not Specified)

TAPE USE: Self Recording Tape

1. Set the following SWs to ON position.
    - SW51-1~4 (on L2 Board) Line and Field Shuffle SW
    - SW1~4 (on L3 Board) Video/Audio ECC SW
    - SW802 (on L4 Board) Video Conceal SW
2. Make a recording for a few minutes with other VTR.
3. Make a Audio CH1, CH3 insert edit using the other VTR recorded tape.
4. Play back the just inserted portion and monitor the CH1, CH3 Audio sound.
5. Confirm that the IN and OUT point has no Audio mute and no high error on the Error Rate display.
6. If the Audio mute occurs, please reconfirm the FE Head Height.

SPECTRUM ANALYZER SETUP
(MODEL HP8591A)

1. SETUP — REG 1

ITEM	PARAMETER
(1) REF LEVEL	0dBm
(2) ATTEN	10dB
(3) DIV (dB/DIV)	10dB/div
(4) CENTER FREQUENCY	27.5MHz
(5) FREQUENCY SPAN	10MHz
(6) RES BW	100kHz
(7) VIDEO BW	3kHz
(8) SWEEP TIME	300msec
(9) TRIGGER	EXT (HEAD SW)
(10) VID AVG	30

2. SETUP — REG 2

ITEM	PARAMETER
(1) REF LEVEL	0dBm
(2) ATTEN	10dB
(3) DIV (dB/DIV)	10dB/div
(4) CENTER FREQUENCY	27.5MHz
(5) FREQUENCY SPAN	10MHz
(6) RES BW	100kHz
(7) VIDEO BW	3kHz
(8) SWEEP TIME	300msec
(9) TRIGGER	EXT (HEAD SW)
(10) VID AVG	30

3. SETUP — REG 3

ITEM	PARAMETER
(1) REF LEVEL	0dBm
(2) ATTEN	10dB
(3) DIV (dB/DIV)	10dB/div
(4) START FREQUENCY	20MHz
(5) STOP FREQUENCY	70MHz
(6) RES BW	300kHz
(7) VIDEO BW	3kHz
(8) SWEEP TIMER	30msec
(9) TRIGGER	FREE RUM

4. SETUP — REG 4

ITEM	PARAMETER
(1) REF LEVEL	-10dBm
(2) ATTEN	10dB
(3) DIV (dB/DIV)	5dB/div
(4) START FREQUENCY	0MHz
(5) STOP FRQUENCY	50MHz
(6) RES BW	1MHz
(7) VIDEO BW	3kHz
(8) SWEEP TIME	300msec
(9) TRIGGER	EXT (HEAD SW)
(10) VID AVG	10

5. SETUP — REG 5

ITEM	PARAMETER
(1) REF LEVEL	-20dBm
(2) ATTEN	10dB
(3) DIV (dB/DIV)	5dB/div
(4) START FREQUENCY	0MHz
(5) STOP FREQUENCY	50MHz
(6) RES BW	1kHz
(7) VIDEO BW	3kHz
(8) SWEEP TIME	300msec
(9) TRIGGER	EXT (HEAD SW)

6. SETUP — REG 6

ITEM	PARAMETER
(1) REF LEVEL	-15dBm
(2) ATTEN	10dB
(3) DIV (dB/DIV)	5dB/div
(4) START FREQUENCY	27.5MHz
(5) STOP FREQUENCY	0MHz
(6) RES BW	1MHz
(7) VIDEO BW	3kHz
(8) SWEEP TIME	200msec
(9) TRIGGER	EXT (HEAD SW)
(10)VID AVG	5

[AZIMUTH TOOL ADJUSTMENT]

1. VR PRESETTING

1) Tool Setting
*LINEARITY/HEIGHT SW : LINEARITY
*PAL/NTSC SW : PAL or NTSC depend on VTR in use
*A(FIX POSITION)/B(NOT USED) SW : A

2) VR Setting (AZIMUTH & DET P.C.Board)

*VR9 : Fully clockwise

*VR10 : Fully counterclockwise

3) VR Setting (VIDEO 2 P.C.Board)

*VR1 (Y RF LEVEL) : Fully Counterclockwise

*VR17 (C RF LEVEL) : Fully Counterclockwise

*VR8 (Y V-V RF LEVEL) : Fully clockwise

*VR24 (C V-V RF LEVEL) : Fully counterclockwise

*VR3 (Y CH1 EQ1) : Fully counterclockwise

*VR19 (C CH1 EQ1) : Fully clockwise

*VR14 (Y OUT LEVEL) : Fully counterclockwise

*VR30 (C OUT LEVEL) : Fully counterclockwise

*VR15 (Y DOC DET) : Fully counterclockwise

*VR31 (C DOC DET) : Fully clockwise

2. CONFIRMATION OF HEAD AMP OPERATION

1) Play back a 75% color bar portion of the Alignment Tape.
2) Confirm that the envelopes appear at TP11 and TP12 (on REC AMP BOARD) when CUE REC LINPUT is shorted.

3. CONFIRM AND ADJUSTMENT FOR HEAD HEIGHT

1) Connect the tool and AJ-D350.
2) Set the Tool condition as follows.
   MODE : Head Height
   NTAC/PAL : According to your VTR
3) Insert the Alignment tape (75% color bar portion) and place the unit in the VAR × 3 mode.
4) SCOPE CH1 : TP3 (CH0 ENV) or TP11 (CH1 ENV)
   SCOPE TRIGGER : TP12 (on the Azimuth & DET Board)
5) Confirm that the triangle shape is saturated or not at TP3 and TP11 as shown in Figure 1.
   If it is saturated (trapezoid shape), adjust VR7 (CH0 RF LEVEL) and VR6 (CH1 RF LEVEL) so that the envelope shape becomes just triangle shape, then turn the same VR further with a touch as shown in Figure 1.

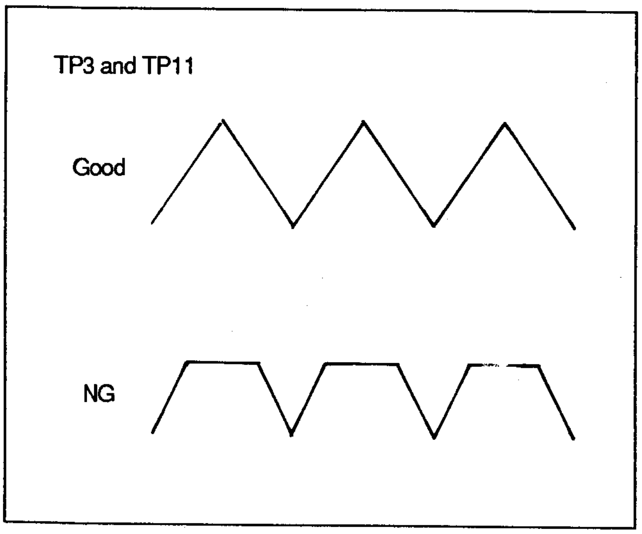


Figure 1

6) Adjust VR1 (CH0 DC) and VR2 (CH1 DC) so that the off set level is 0VDC as shown in Figure 2.
7) Adjust VR4 (CH0 ENV_LEVEL) and VR5 (CH1 ENV_LEVEL) so that the envelope level is 2Vp-p as shown in Figure 2.

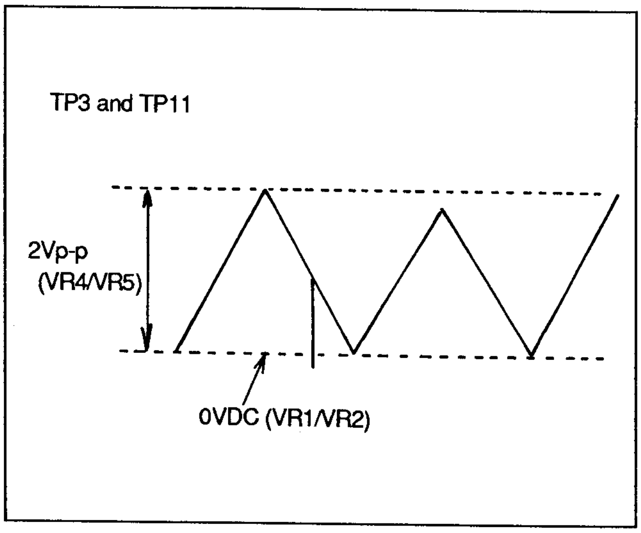


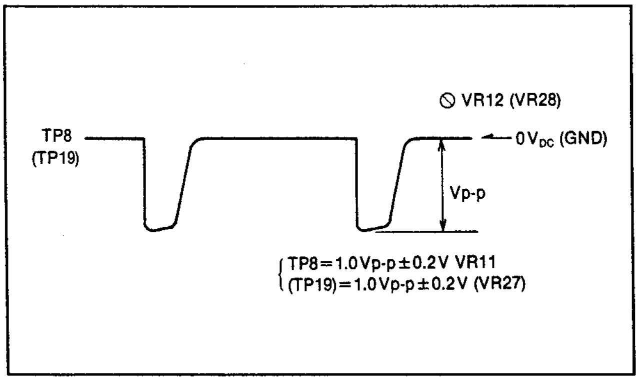
Figure 2

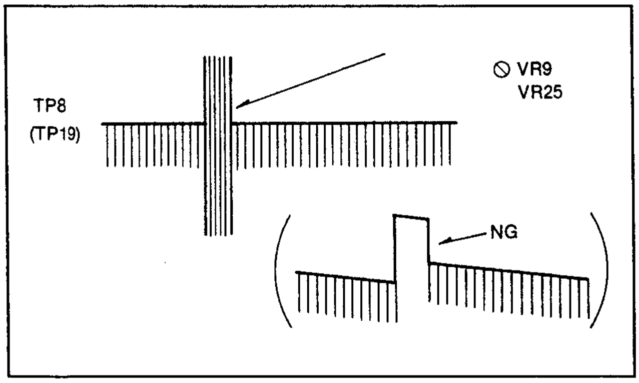
4. DEMOD (1) ADJUSTMENT

Test Points : TP8, TP19 (VIDEO 2)
Adjustments : VR12, VR28, VR9, VR25 (VIDEO 2)

Note: TP8 (TP19) means, TP8 is CH0 side and (TP19) is CH1 side.

1) Play back No.3 alignment tape
2) Connect the scope to TP8 (TP19) and adjust VR12 (VR28) so that the A DC level is 0V DC.
3) Adjust VR11 (VR27) so that the B level is 1.0Vp-p ± 0.2Vp-p.
4) Set the scope to V rate and DC mode and adjust VR9 (VR25) so that the output noise is stable and average level as shown in Figure.


⊘ VR12 (VR28)
TP8
(TP19)
0 V$_{DC}$ (GND)
Vp-p
TP8=1.0Vp-p±0.2V VR11
(TP19)=1.0Vp-p±0.2V (VR27)


⊘ VR9
VR25
TP8
(TP19)
NG

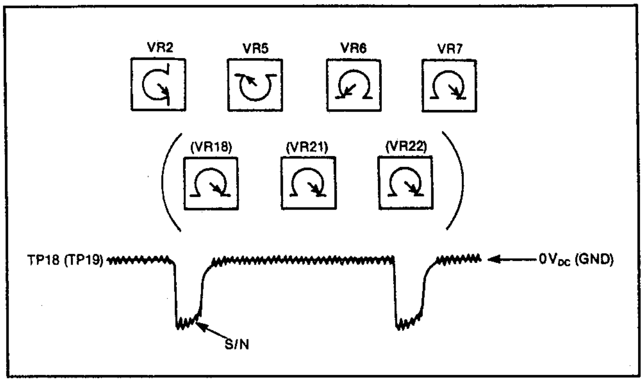
5. DEMOD (2) ADJUSTMENT

Test Points : TP18, TP19 (AZIMUTH & DETECT)
Adjustments : VR2, VR5, VR6, VR7, VR18, VR21, VR22

Note: TP18 (TP19) means, TP18 is CH0 side and (TP19) is CH1 side.

1) Play back No.3 alignment tape.
2) Connect the scope to TP18 (TP19) and Set the scope to H rate and DC mode.
3) Adjust VR2, VR5, VR6 and VR7 so that the signal noise of output is minimum as shown in Figure.

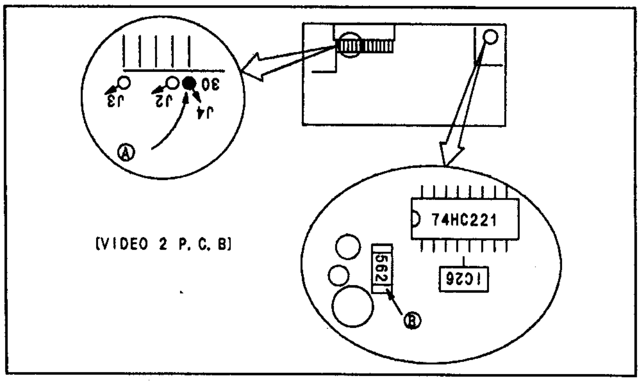
Note: Adjust each VR as shown below.
Adjust for minimum signal noise.

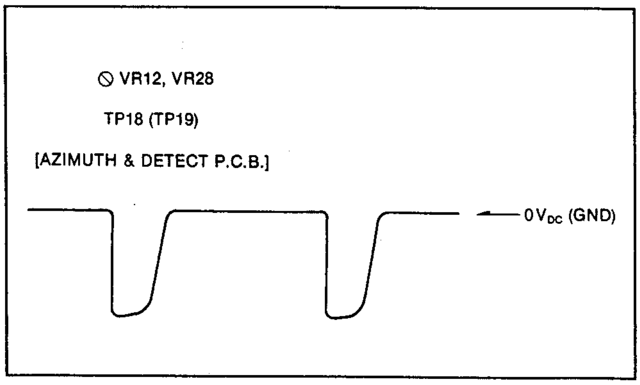

VR2
VR5
VR6
VR7
(VR18)
(VR21)
(VR22)
TP18 (TP19)
0V$_{DC}$ (GND)
S/N

6. DEMOD (3) ADJUSTMENT

Test Points : A, B (VIDEO 2)
TP18, TP19 (AZIMUTH & DETECT)
Adjustments : VR15, VR31, VR12, VR28

1) Play back No.3 alignment Tape.
2) Connect the scope CH1 to A point and CH2 to B point. And set the scope to DC mode.
3) Adjust VR15 and VR31 so that the output DC level is 0.08V ± 0.01V DC.
4) Connect the scope to TP18 (TP19) and adjust VR12 (VR28) so that the output DC level is 0V DC.


J3
J2
30
J4
Ⓐ
[VIDEO 2 P. C. B]
74HC221
562
IC26
Ⓑ

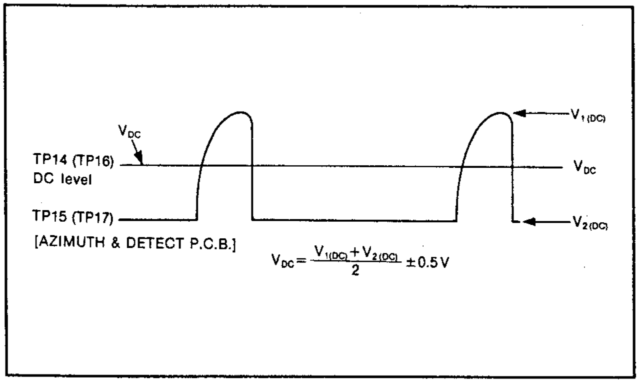

⊘ VR12, VR28
TP18 (TP19)
[AZIMUTH & DETECT P.C.B.]
0V$_{DC}$ (GND)

7. COMPARATOR ADJUSTMENT

Test Points : TP14,TP15,TP16,TP17 (AZIMUTH)
Adjustments : VR12,VR13 (AZIMUTH)

Note: TP14 (TP16) means, TP14 is CH0 side and TP16 is CH1 side.

1) Play back No.3 alignment tape.
2) Connect the scope CH1 to TP14 (TP16) and CH2 to TP15 (TP17). Set the scope to DC mode.
3) Adjust VR12 (VR13) so that the output DC level of TP14 is as shown in Figure.

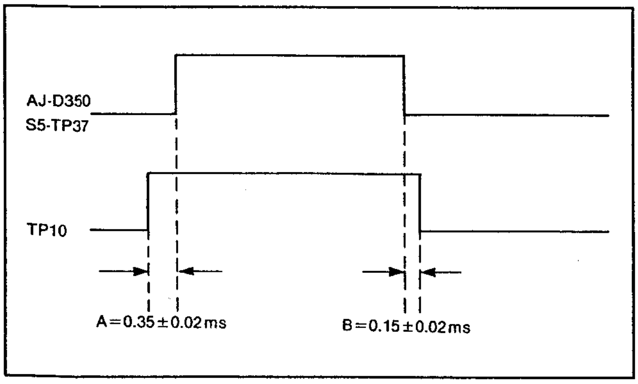

V_DC
TP14 (TP16)
DC level
TP15 (TP17)
[AZIMUTH & DETECT P.C.B.]
V1(DC)
V_DC
V2(DC)

$$V_{DC} = \frac{V_{1(DC)} + V_{2(DC)}}{2} \pm 0.5\,V$$

8. HEAD SWITCHING (NTSC) ADJUSTMENT

Test Points : TP37 of S5 on AJ-D350, TP10 (AZIMUTH & DETECT)
Adjustments : VR9, VR10

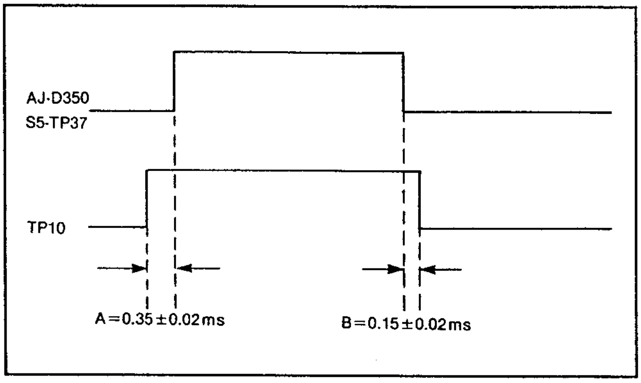
1) Play back No.3 alignment tape.
2) Connect scope CH1 to TP37 of S5 on AJ-D350 and CH2 to TP10.
3) Adjust VR10 so that the A portion is 0.35 ± 0.02ms as shown in Figure.
4) Adjust VR9 so that the B portion is 0.15 ± 0.02ms as shown in Figure.


AJ-D350
S5-TP37
TP10
A=0.35±0.02ms
B=0.15±0.02ms

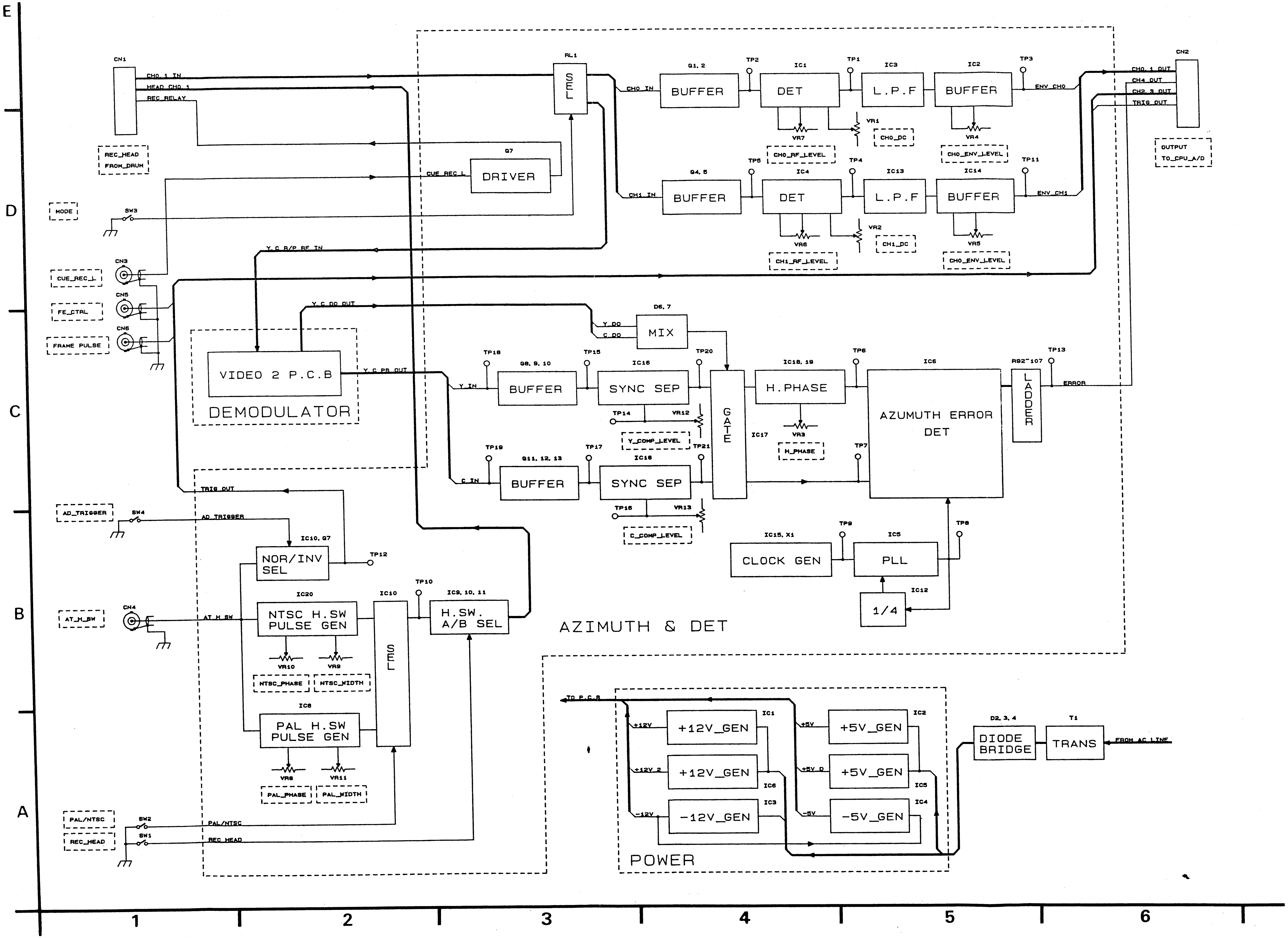
9. HEAD SWITCHING (PAL) ADJUSTMENT

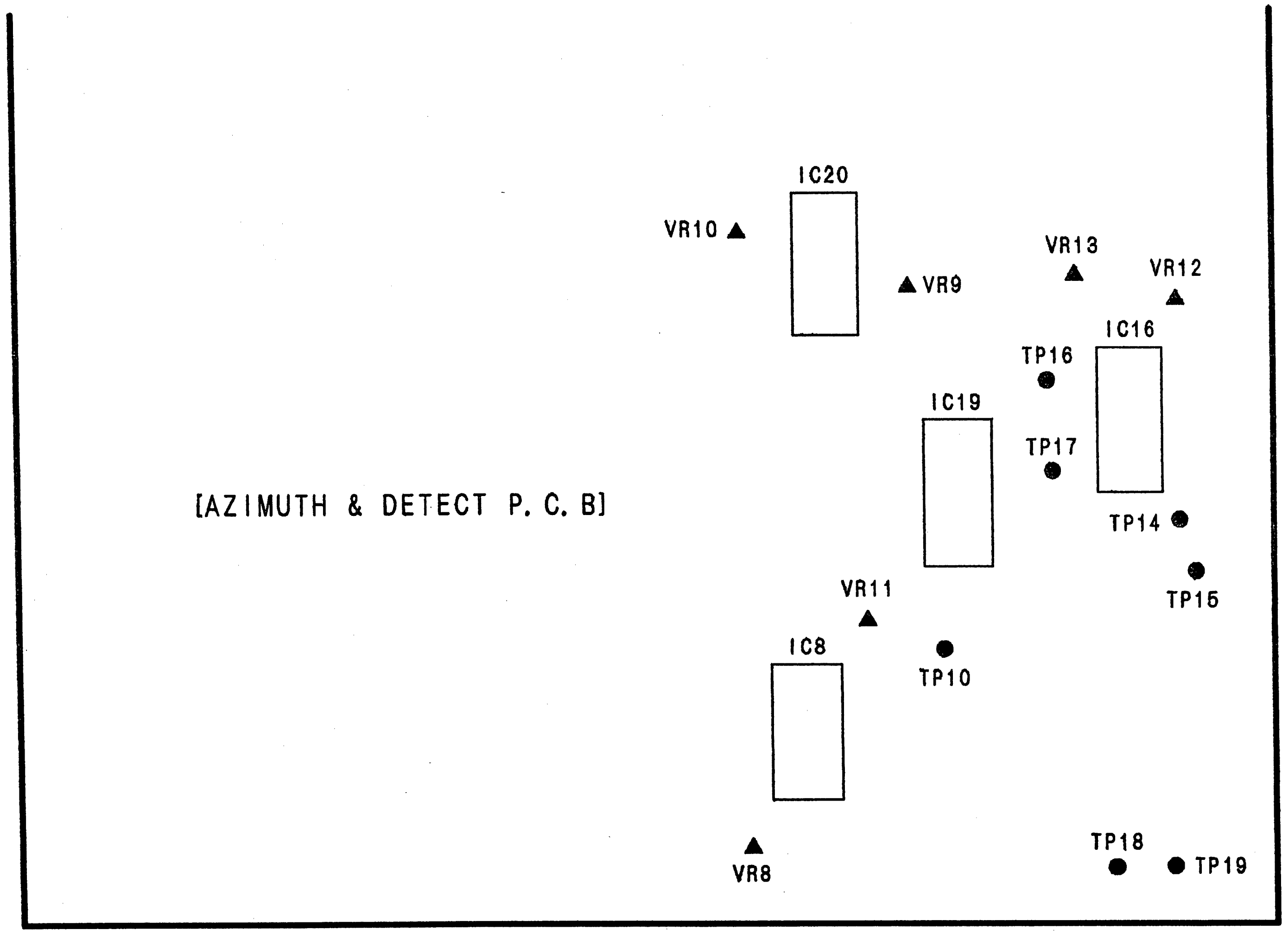
Test Points : TP37 of S5 on AJ-D350, TP10 (AZIMUTH & DETECT)
Adjustments : VR8, VR11

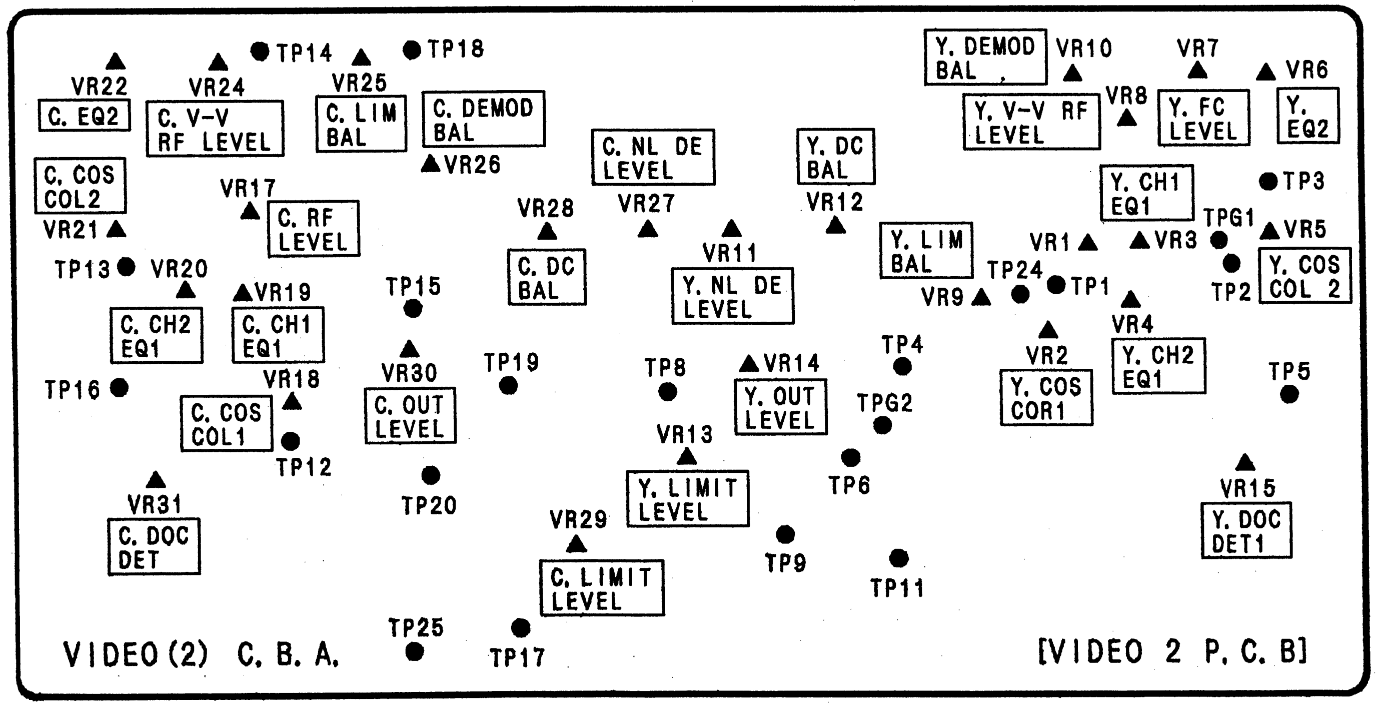
1) Play back No.3 alignment tape.
2) Connect the scope CH1 to TP37 of S5 on AJ-D350 and CH2 to TP10.
3) Adjust VR11 so that the A portion is 0.35 ± 0.02ms as shown in Figure.
4) Adjust VR8 so that the B portion is 0.15 ± 0.02ms as shown in Figure.


AJ-D350
S5-TP37
TP10
A=0.35±0.02ms
B=0.15±0.02ms

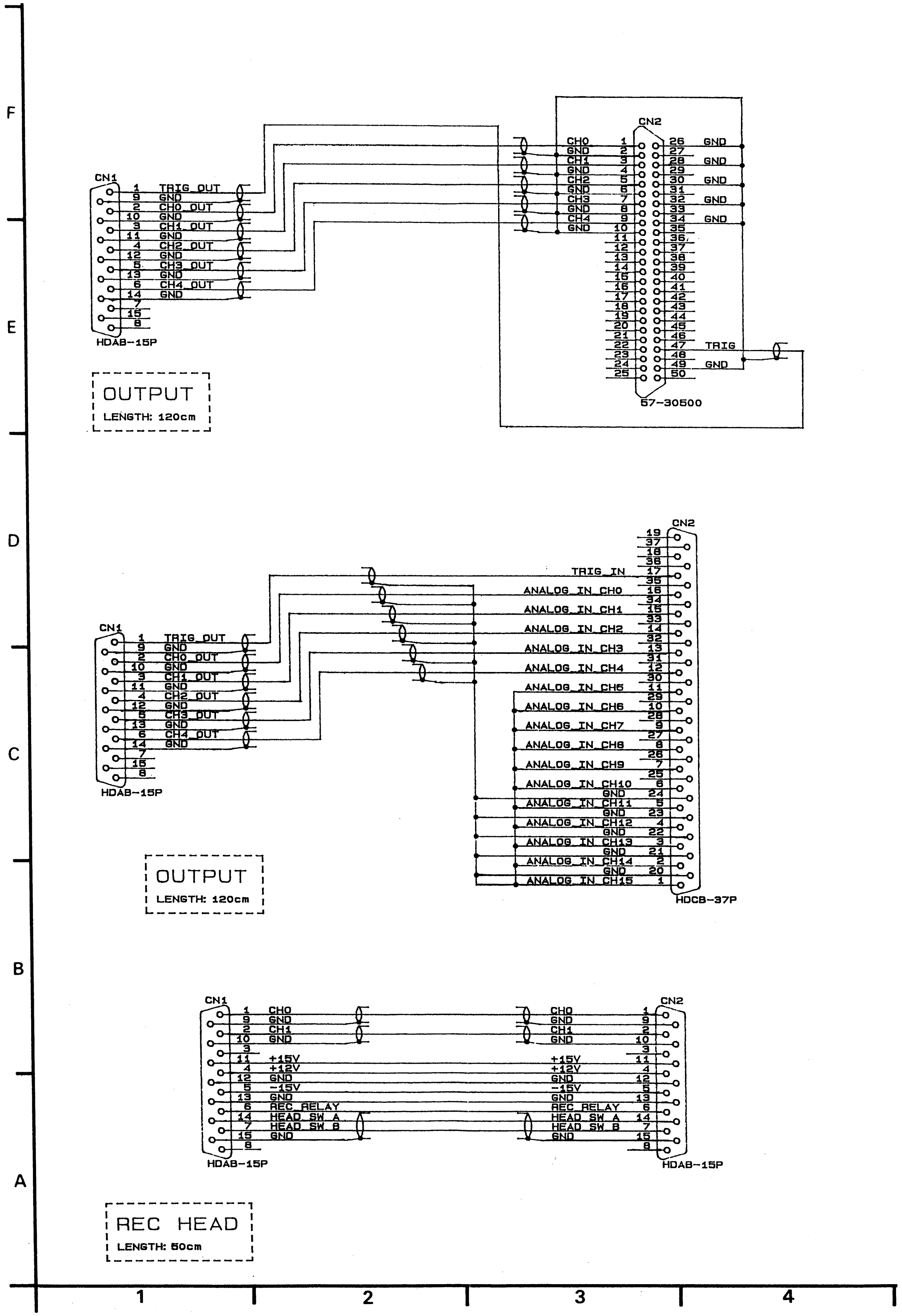
VFK0832 LINEARITY/HEIGHT ADJUSTMENT TOOL BLOCK DIAGRAM


E
D
C
B
A
1
2
3
4
5
6
CN1
CH0, 1 IN
HEAD CH0, 1
REC RELAY
REC_HEAD FROM_DRUM
MODE
SW3
CUE_REC_L
CN3
FE_CTRL
CN5
FRAME PULSE
CN6
RL1
SEL
Q7
DRIVER
CUE REC L
Y, C R/P RF IN
Y, C DO OUT
VIDEO 2 P.C.B
DEMODULATOR
Y, C PB OUT
CH0 IN
Q1, 2
BUFFER
TP2
IC1
DET
TP1
IC3
L.P.F
IC2
BUFFER
TP3
ENV CH0
VR7
CH0_RF_LEVEL
VR1
CH0_DC
VR4
CH0_ENV_LEVEL
CH1 IN
Q4, 5
BUFFER
TP5
IC4
DET
TP4
IC13
L.P.F
IC14
BUFFER
TP11
ENV CH1
VR6
CH1_RF_LEVEL
VR2
CH1_DC
VR5
CH0_ENV_LEVEL
CN2
CH0, 1 OUT
CH4 OUT
CH2, 3 OUT
TRIG OUT
OUTPUT TO_CPU_A/D
D6, 7
MIX
Y DO
C DO
TP18
Q8, 9, 10
Y IN
BUFFER
TP15
IC16
SYNC SEP
TP14
VR12
Y_COMP_LEVEL
TP20
GATE
IC17
TP21
TP19
Q11, 12, 13
C IN
BUFFER
TP17
IC16
SYNC SEP
TP16
VR13
C_COMP_LEVEL
IC18, 19
H.PHASE
VR3
H_PHASE
TP6
TP7
IC6
AZUMUTH ERROR DET
R92~107
LADDER
TP13
ERROR
IC15, X1
CLOCK GEN
TP9
IC5
PLL
TP8
IC12
1/4
AZIMUTH & DET
TRIG OUT
AD_TRIGGER
SW4
AD TRIGGER
IC10, Q7
NOR/INV SEL
TP12
AT_H_SW
CN4
AT H SW
IC20
NTSC H.SW PULSE GEN
VR10
VR9
NTSC_PHASE
NTSC_WIDTH
IC8
PAL H.SW PULSE GEN
VR8
VR11
PAL_PHASE
PAL_WIDTH
IC10
SEL
TP10
IC9, 10, 11
H.SW. A/B SEL
PAL/NTSC
SW2
REC_HEAD
SW1
PAL/NTSC
REC HEAD
TO P.C.B
+12V
IC1
+12V_GEN
+12V 2
+12V_GEN
IC6
-12V
IC3
-12V_GEN
+5V
IC2
+5V_GEN
+5V D
+5V_GEN
IC5
-5V
IC4
-5V_GEN
POWER
D2, 3, 4
DIODE BRIDGE
T1
TRANS
FROM AC LINE

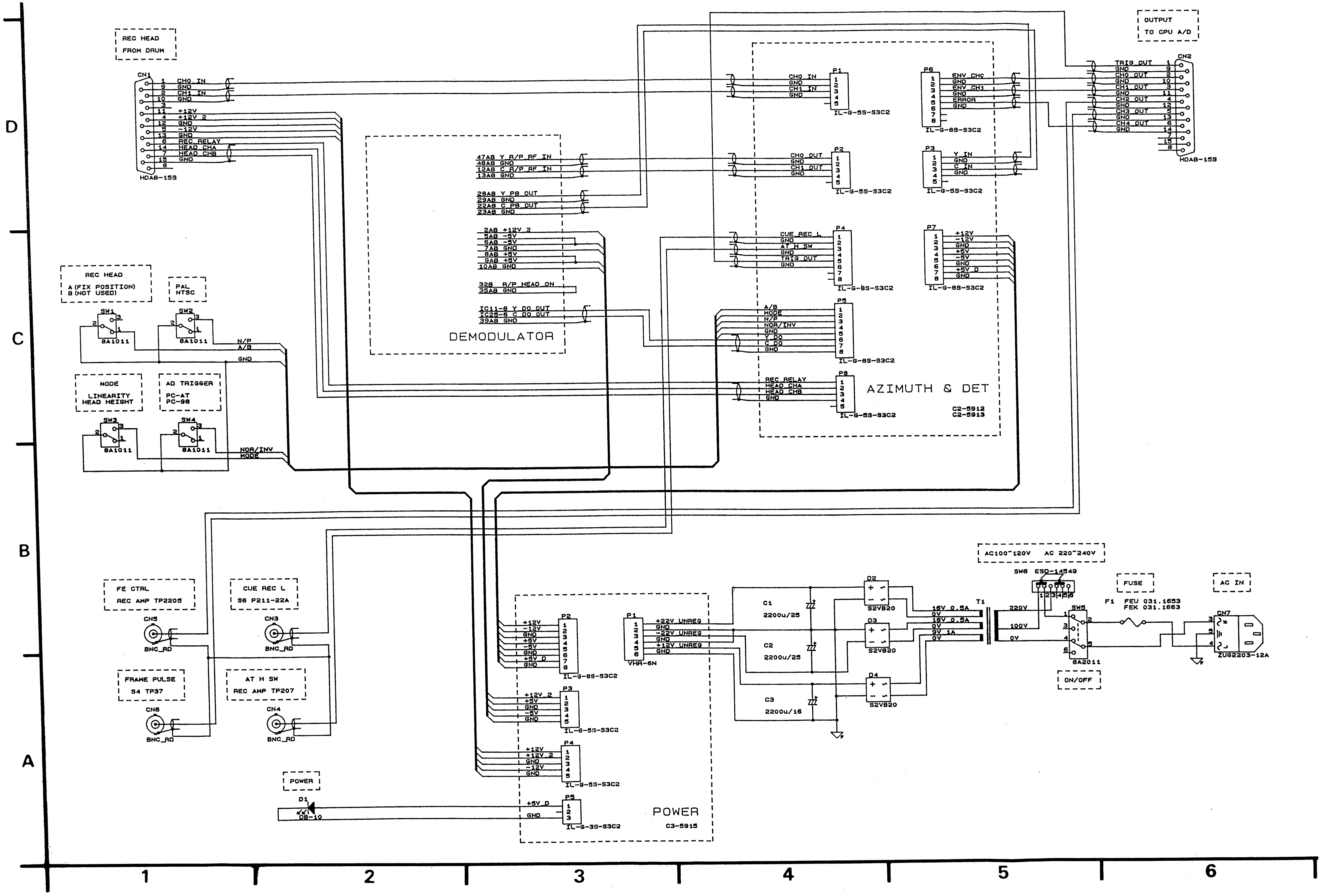

IC20
VR10
VR9
VR13
VR12
IC16
TP16
IC19
TP17
TP14
TP15
VR11
IC8
TP10
TP18
TP19
VR8
[AZIMUTH & DETECT P. C. B]


VR22
C. EQ2
VR24
TP14
C. V-V RF LEVEL
VR25
TP18
C. LIM BAL
C. DEMOD BAL
VR26
C. COS COL2
VR21
VR17
C. RF LEVEL
TP13
VR20
VR19
C. CH2 EQ1
C. CH1 EQ1
VR18
TP16
C. COS COL1
TP12
VR31
C. DOC DET
TP15
VR30
C. OUT LEVEL
TP20
TP19
VR28
C. DC BAL
VR27
C. NL DE LEVEL
VR11
Y. NL DE LEVEL
TP8
VR14
Y. OUT LEVEL
VR13
Y. LIMIT LEVEL
VR29
C. LIMIT LEVEL
TP9
TP25
TP17
Y. DC BAL
VR12
Y. LIM BAL
TP4
TPG2
TP6
TP11
Y. DEMOD BAL
VR10
Y. V-V RF LEVEL
VR8
VR7
Y. FC LEVEL
VR6
Y. EQ2
Y. CH1 EQ1
TP3
TPG1
VR1
VR3
VR5
TP24
VR9
TP1
TP2
Y. COS COL 2
VR4
VR2
Y. CH2 EQ1
Y. COS COR1
TP5
VR15
Y. DOC DET1
VIDEO (2) C. B. A.
[VIDEO 2 P. C. B]

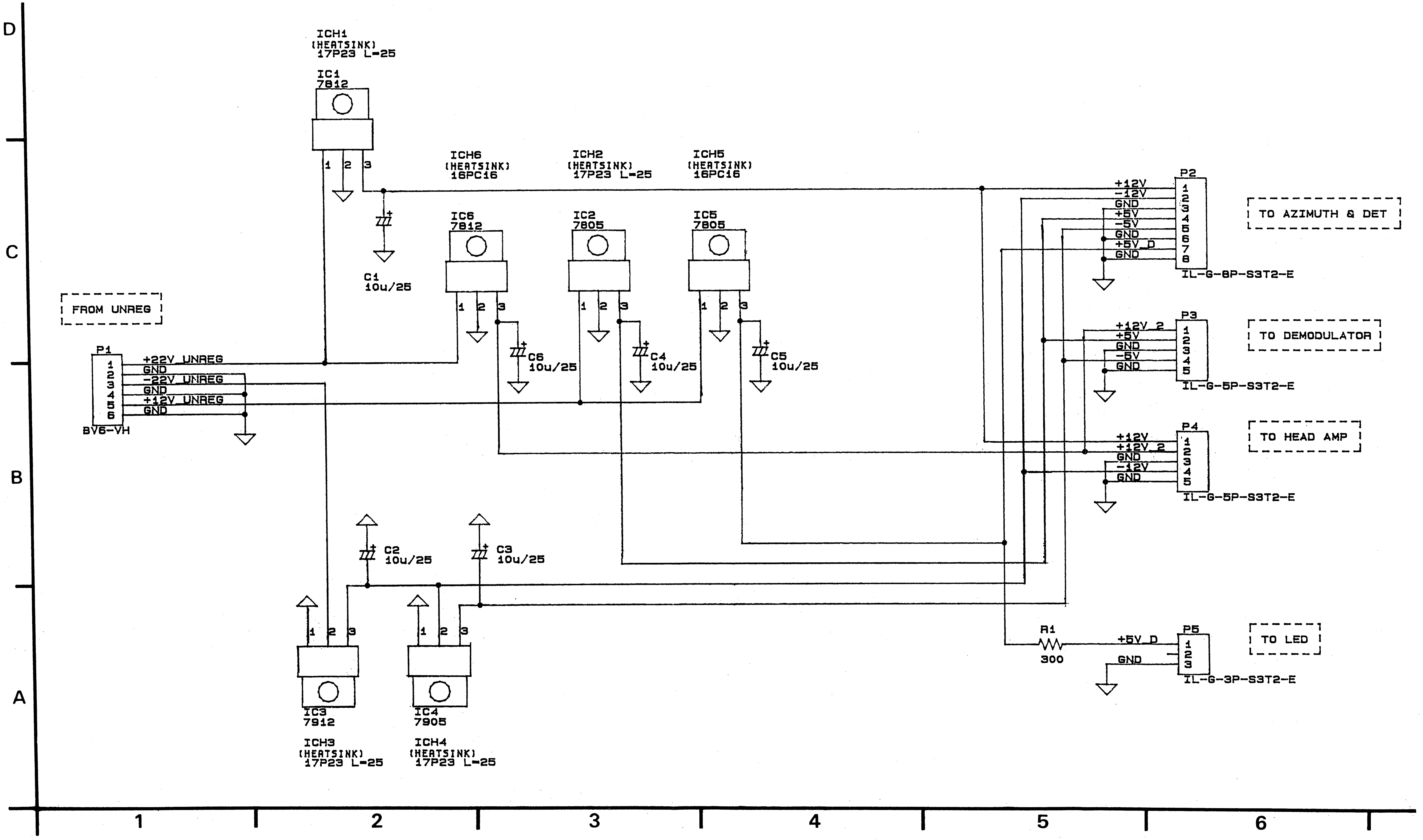
VFK0832 CABLE 2, CABLE 3, CABLE 4 SCHEMATIC DIAGRAM


F
E
D
C
B
A
1
2
3
4
CN1
TRIG OUT
GND
CH0 OUT
CH1 OUT
CH2 OUT
CH3 OUT
CH4 OUT
HDAB-15P
CN2
CH0
CH1
CH2
CH3
CH4
GND
TRIG
57-30500
OUTPUT
LENGTH: 120cm
TRIG IN
ANALOG IN CH0
ANALOG IN CH1
ANALOG IN CH2
ANALOG IN CH3
ANALOG IN CH4
ANALOG IN CH5
ANALOG IN CH6
ANALOG IN CH7
ANALOG IN CH8
ANALOG IN CH9
ANALOG IN CH10
ANALOG IN CH11
ANALOG IN CH12
ANALOG IN CH13
ANALOG IN CH14
ANALOG IN CH15
HDCB-37P
OUTPUT
LENGTH: 120cm
+15V
+12V
-15V
REC RELAY
HEAD SW A
HEAD SW B
REC HEAD
LENGTH: 50cm

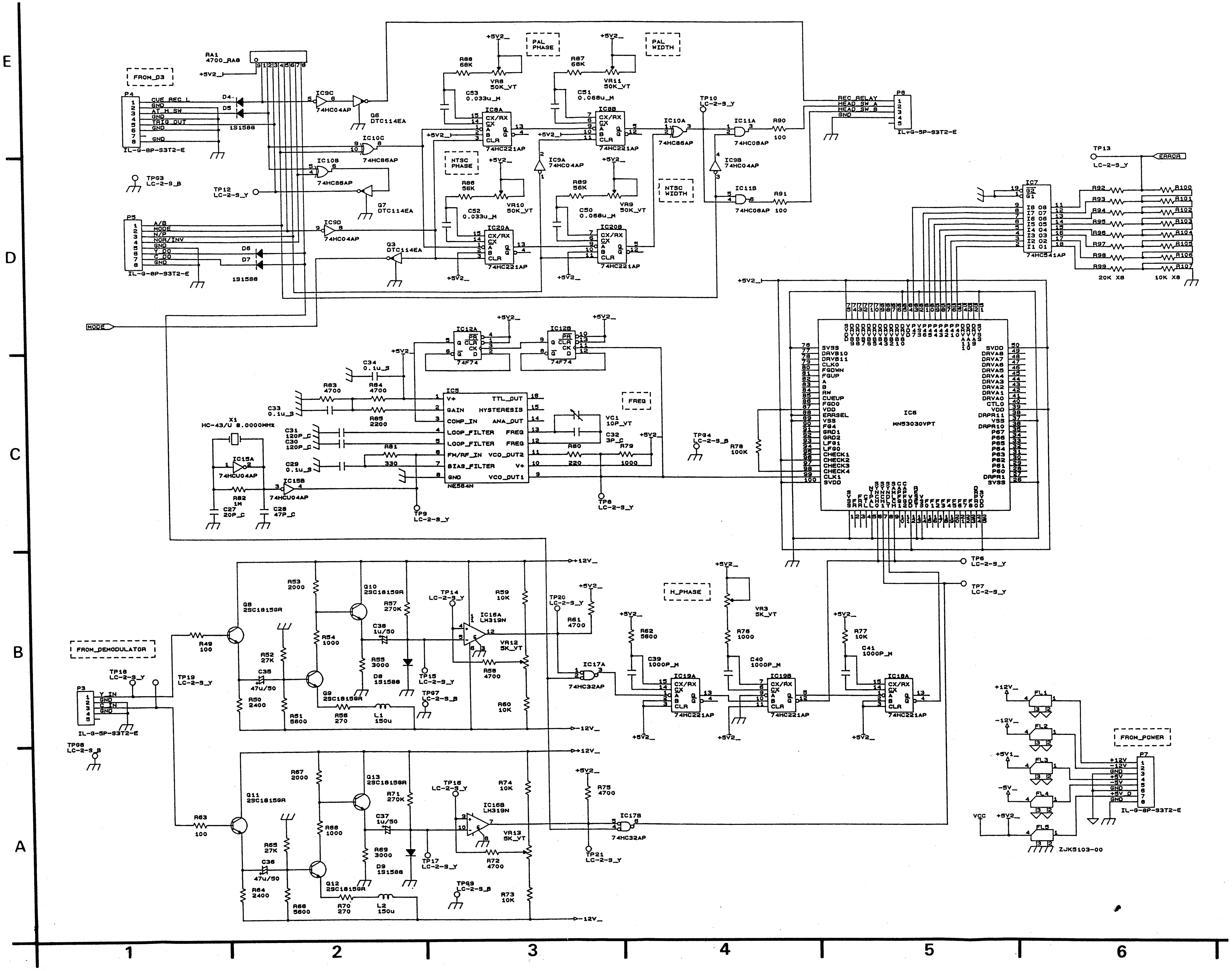
VFK0832 INTERCONNECTION SCHEMATIC DIAGRAM


REC HEAD FROM DRUM
CN1
1 CH0 IN
9 GND
2 CH1 IN
10 GND
3
11 +12V
4 +12V 2
12 GND
5 −12V
13 GND
6 REC RELAY
14 HEAD CHA
7 HEAD CHB
15 GND
8
HDA8-15S
REC HEAD
A (FIX POSITION)
B (NOT USED)
PAL
NTSC
SW1
SW2
8A1011
N/P
A/B
GND
MODE
LINEARITY
HEAD HEIGHT
AD TRIGGER
PC-AT
PC-98
SW3
SW4
NOR/INV
MODE
47AB Y R/P RF IN
48AB GND
12AB C R/P RF IN
13AB GND
28AB Y PB OUT
29AB GND
22AB C PB OUT
23AB GND
2AB +12V 2
5AB −5V
6AB −5V
7AB GND
8AB +5V
9AB +5V
10AB GND
32B R/P HEAD ON
33AB GND
IC11-6 Y DO OUT
IC25-6 C DO OUT
39AB GND
DEMODULATOR
P1
CH0 IN
GND
CH1 IN
GND
IL-G-5S-S3C2
P2
CH0 OUT
GND
CH1 OUT
GND
IL-G-5S-S3C2
P4
CUE REC L
GND
AT H SW
GND
TRIG OUT
GND
IL-G-8S-S3C2
P5
A/B
MODE
N/P
NOR/INV
GND
Y DO
C DO
GND
IL-G-8S-S3C2
P8
REC RELAY
HEAD CHA
HEAD CHB
GND
IL-G-5S-S3C2
P6
ENV CH0
GND
ENV CH1
GND
ERROR
GND
IL-G-8S-S3C2
P3
Y IN
GND
C IN
GND
IL-G-5S-S3C2
P7
+12V
−12V
GND
+5V
−5V
GND
+5V D
GND
IL-G-8S-S3C2
AZIMUTH & DET
C2-5912
C2-5913
OUTPUT TO CPU A/D
CN2
TRIG OUT 1
GND 9
CH0 OUT 2
GND 10
CH1 OUT 3
GND 11
CH2 OUT 4
GND 12
CH3 OUT 5
GND 13
CH4 OUT 6
GND 14
7
15
8
HDA8-15S
FE CTRL
REC AMP TP2205
CN5
BNC_RO
CUE REC L
S6 P211-22A
CN3
BNC_RO
FRAME PULSE
S4 TP37
CN6
BNC_RO
AT H SW
REC AMP TP207
CN4
BNC_RO
POWER
D1
DB-10
P2
+12V
−12V
GND
+5V
−5V
GND
+5V D
GND
IL-G-8S-S3C2
P3
+12V 2
+5V
GND
−5V
GND
IL-G-5S-S3C2
P4
+12V
+12V 2
GND
−12V
GND
IL-G-5S-S3C2
P5
+5V D
GND
IL-G-3S-S3C2
P1
+22V UNREG
GND
−22V UNREG
GND
+12V UNREG
GND
VHR-6N
C1
2200u/25
C2
2200u/25
C3
2200u/16
D2
D3
D4
S2VB20
POWER
C3-5915
T1
16V 0.5A
0V
16V 0.5A
0V
9V 1A
0V
220V
100V
0V
AC100~120V AC 220~240V
SW6 ESD-14549
SW5
8A2011
ON/OFF
FUSE
F1 FEU 031.1653
FEK 031.1663
AC IN
CN7
ZUG2203-12A
D
C
B
A
1
2
3
4
5
6

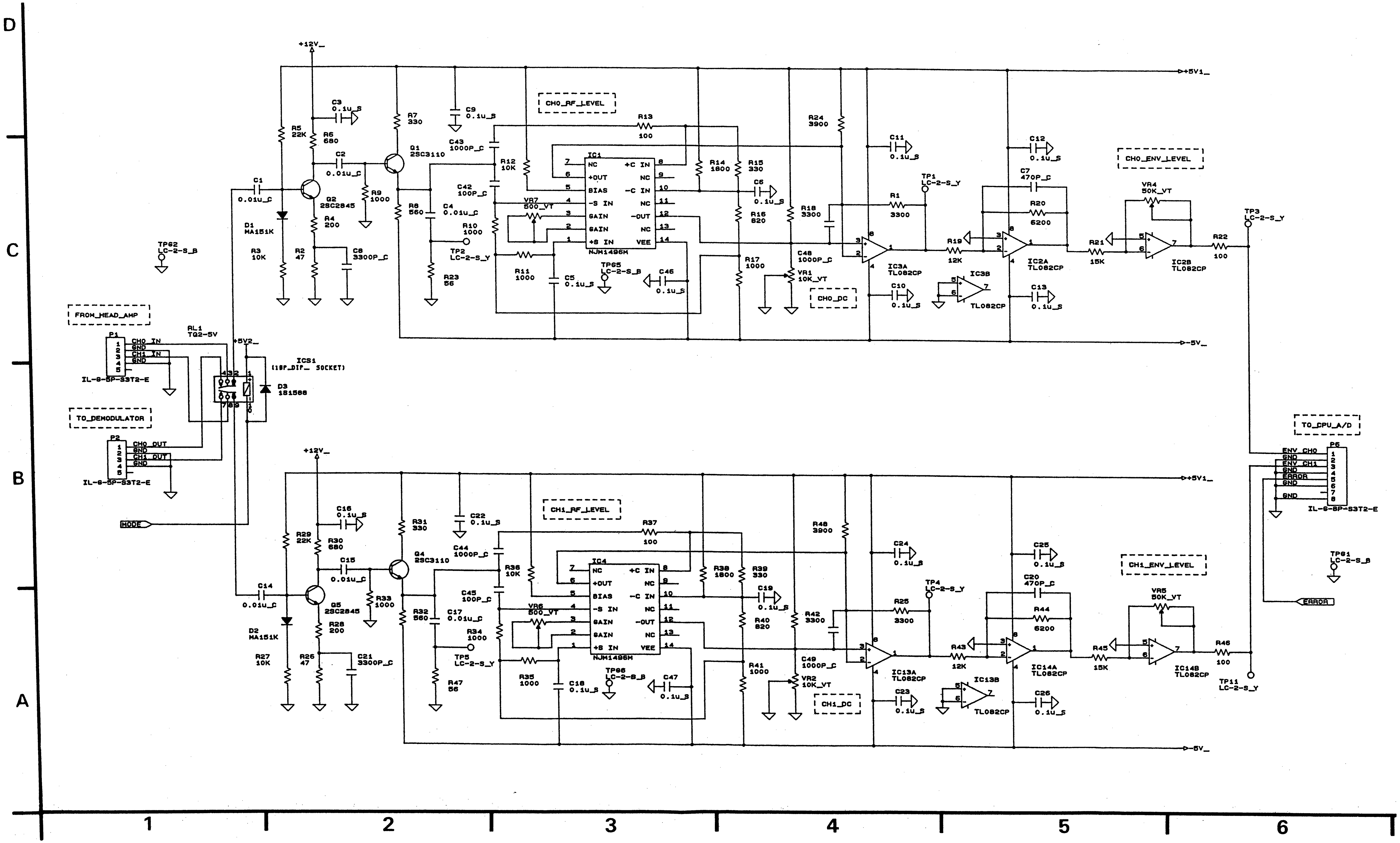
VFK0832 POWER SUPPLY SCHEMATIC DIAGRAM


D
C
B
A
1
2
3
4
5
6
ICH1
(HEATSINK)
17P23 L=25
IC1
7812
1 2 3
ICH6
(HEATSINK)
16PC16
ICH2
(HEATSINK)
17P23 L=25
ICH5
(HEATSINK)
16PC16
C1
10u/25
IC6
7812
IC2
7805
IC5
7805
C6
10u/25
C4
10u/25
C5
10u/25
FROM UNREG
P1
+22V UNREG
GND
-22V UNREG
GND
+12V UNREG
GND
BV6-VH
P2
+12V
-12V
GND
+5V
-5V
GND
+5V_D
GND
IL-G-8P-S3T2-E
TO AZIMUTH & DET
P3
+12V_2
+5V
GND
-5V
GND
IL-G-5P-S3T2-E
TO DEMODULATOR
P4
+12V
+12V_2
GND
-12V
GND
IL-G-5P-S3T2-E
TO HEAD AMP
C2
10u/25
C3
10u/25
IC3
7912
ICH3
(HEATSINK)
17P23 L=25
IC4
7905
ICH4
(HEATSINK)
17P23 L=25
R1
300
P5
+5V_D
GND
IL-G-3P-S3T2-E
TO LED

VFK0832 AZIMUTH & DETECTION (AZIMUTH SECTION) SCHEMATIC DIAGRAM

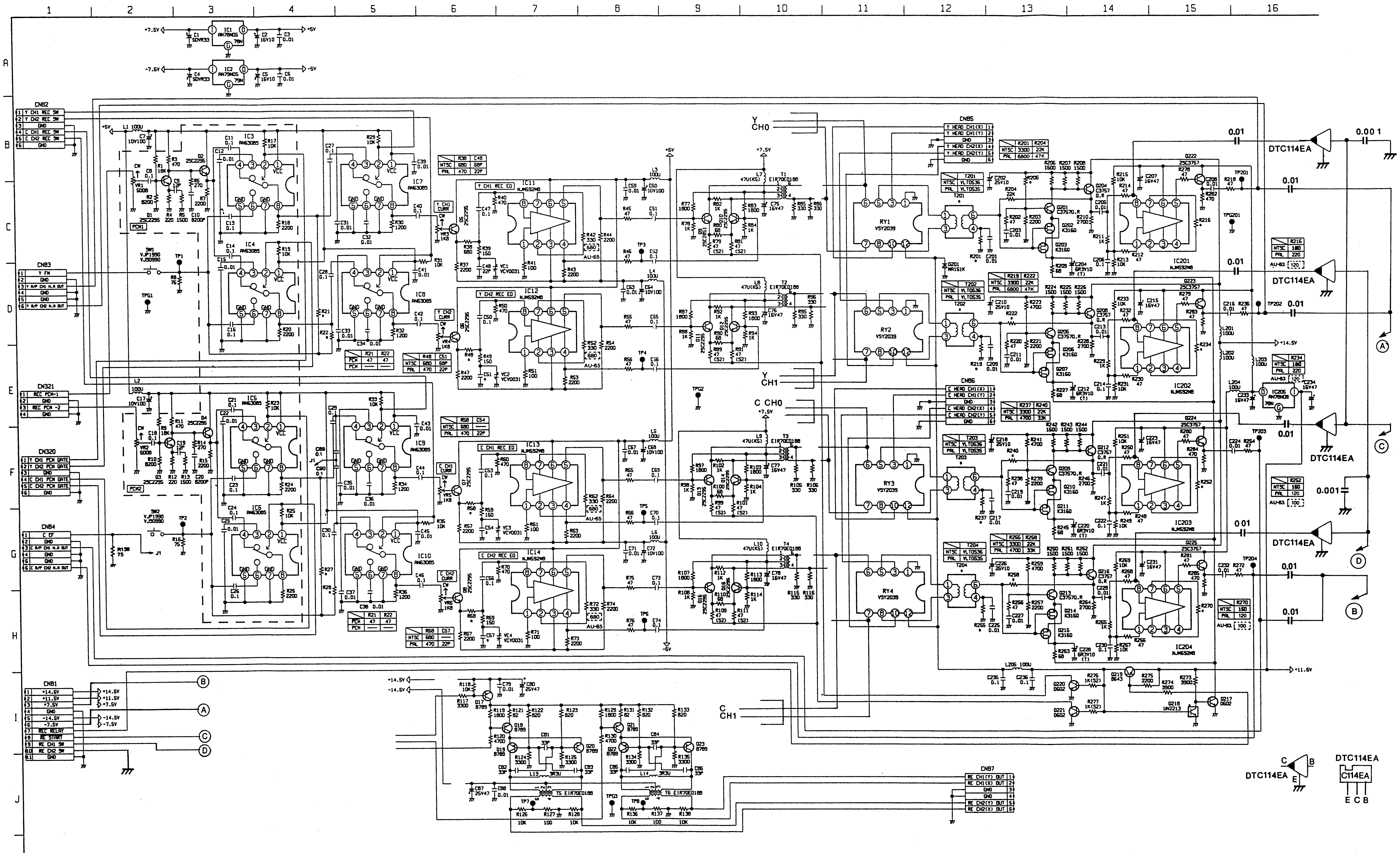

E
D
C
B
A
1
2
3
4
5
6
FROM_D3
RA1 4700_RA8
P4
CUE_REC_L
GND
AT_H_SW
TRIG_OUT
IL-G-8P-S3T2-E
D4
D5
1S1588
IC9C
74HC04AP
Q6 DTC114EA
IC10C
74HC86AP
IC10B
IC10D
Q7 DTC114EA
TPG3 LC-2-S_B
TP12 LC-2-S_Y
P5
A/B
MODE
N/P
NOR/INV
Y_DO
C_DO
D6
D7
IC9D
Q3 DTC114EA
PAL PHASE
PAL WIDTH
NTSC PHASE
NTSC WIDTH
R88 68K
R87 68K
VR8 50K_VT
VR11 50K_VT
C53 0.033u_M
C51 0.068u_M
IC8A
IC8B
74HC221AP
R86 56K
R89 56K
VR10 50K_VT
VR9 50K_VT
C52 0.033u_M
C50 0.068u_M
IC20A
IC20B
IC9A
TP10 LC-2-S_Y
IC10A
IC11A
74HC08AP
IC9B
IC11B
R90 100
R91 100
REC_RELAY
HEAD_SW_A
HEAD_SW_B
P8
IL-G-5P-S3T2-E
TP13 LC-2-S_Y
ERROR
IC7
74HC541AP
R92
R93
R94
R95
R96
R97
R98
R99
R100
R101
R102
R103
R104
R105
R106
R107
20K X8
10K X8
MODE
IC12A
IC12B
74F74
C34 0.1u_S
R83 4700
R84 4700
C33 0.1u_S
IC5
NE564N
V+
GAIN
COMP_IN
LOOP_FILTER
FM/RF_IN
BIAS_FILTER
TTL_OUT
HYSTERESIS
ANA_OUT
FREQ
VCO_OUT2
VCO_OUT1
FREQ
VC1 10P_VT
C32 3P_C
R85 2200
C31 120P_C
C30 120P_C
C29 0.1u_S
R81 330
R80 220
R79 1000
X1 HC-43/U 8.0000MHZ
IC15A
IC15B
74HCU04AP
R82 1M
C27 20P_C
C28 47P_C
TP9 LC-2-S_Y
TP8 LC-2-S_Y
TP4 LC-2-S_B
R78 100K
IC6
MN53030VPT
+5V2
+12V
-12V
TP6 LC-2-S_Y
TP7 LC-2-S_Y
R53 2000
Q8 2SC1815GR
Q10 2SC1815GR
R57 270K
TP14 LC-2-S_Y
IC16A LM319N
R59 10K
TP20 LC-2-S_Y
R61 4700
H_PHASE
VR3 5K_VT
R62 5600
R76 1000
R77 10K
FROM_DEMODULATOR
R49 100
R52 27K
C35 47u/50
R54 1000
C36 1u/50
R55 3000
D8 1S1588
TP15 LC-2-S_Y
TP97 LC-2-S_B
VR12 5K_VT
R58 4700
R60 10K
IC17A
74HC32AP
C39 1000P_M
C40 1000P_M
C41 1000P_M
IC19A
IC19B
IC18A
74HC221AP
TP18 LC-2-S_Y
TP19 LC-2-S_Y
P3
Y_IN
GND
C_IN
IL-G-5P-S3T2-E
R50 2400
R51 5600
Q9 2SC1815GR
R56 270
L1 150u
TPG8 LC-2-S_B
FL1
FL2
FL3
FL4
FL5
FROM_POWER
P7
IL-G-8P-S3T2-E
ZJK5103-00
+5V1
-5V
VCC
+5V_D
R67 2000
Q11 2SC1815GR
Q13 2SC1815GR
R71 270K
TP16 LC-2-S_Y
IC16B LM319N
R74 10K
R75 4700
IC17B
74HC32AP
R63 100
R68 1000
C37 1u/50
R65 27K
C38 47u/50
R69 3000
D9 1S1588
TP17 LC-2-S_Y
R72 4700
VR13 5K_VT
TP21 LC-2-S_Y
TP69 LC-2-S_B
R73 10K
R64 2400
R66 5600
Q12 2SC1815GR
R70 270
L2 150u

VFK0832 AZIMUTH & DETECTION (DETECTION SECTION) SCHEMATIC DIAGRAM

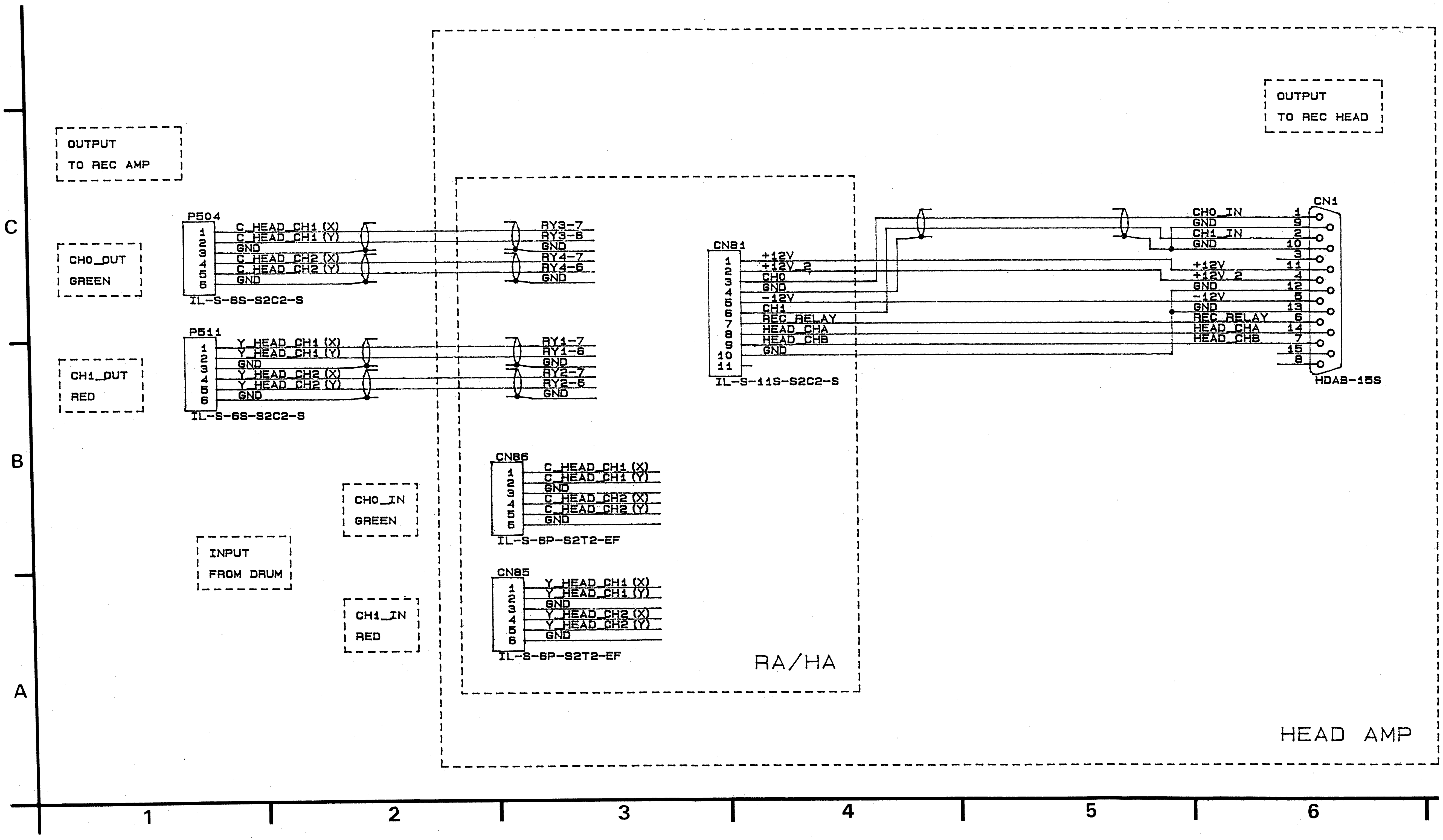


D
C
B
A
1
2
3
4
5
6
+12V
+5V1
-5V
+5V2
CH0_RF_LEVEL
CH1_RF_LEVEL
CH0_ENV_LEVEL
CH1_ENV_LEVEL
CH0_DC
CH1_DC
FROM_HEAD_AMP
TO_DEMODULATOR
TO_CPU_A/D
MODE
ERROR
P1
CH0 IN
GND
CH1 IN
GND
IL-5-5P-S3T2-E
P2
CH0 OUT
GND
CH1 OUT
GND
IL-5-5P-S3T2-E
P5
ENV CH0
GND
ENV CH1
GND
ERROR
GND
GND
IL-8-8P-S3T2-E
RL1
TQ2-5V
ICS1
(18P_DIP_ SOCKET)
D3
1S1588
D1
MA151K
D2
MA151K
Q1
2SC3110
Q2
2SC2845
Q4
2SC3110
Q5
2SC2845
IC1
NJM1496M
IC4
NJM1496M
NC
+OUT
BIAS
-S IN
GAIN
GAIN
+S IN
+C IN
NC
-C IN
NC
-OUT
NC
VEE
IC3A
TL082CP
IC3B
TL082CP
IC2A
TL082CP
IC2B
TL082CP
IC13A
TL082CP
IC13B
TL082CP
IC14A
TL082CP
IC14B
TL082CP
VR1
10K_VT
VR2
10K_VT
VR4
50K_VT
VR5
50K_VT
VR7
500_VT
VR6
500_VT
TP1
LC-2-S_Y
TP2
LC-2-S_Y
TP3
LC-2-S_Y
TP4
LC-2-S_Y
TP5
LC-2-S_Y
TP11
LC-2-S_Y
TP61
LC-2-S_B
TP62
LC-2-S_B
TP65
LC-2-S_B
TP66
LC-2-S_B
C1 0.01u_C
C2 0.01u_C
C3 0.1u_S
C4 0.01u_C
C5 0.1u_S
C6 0.1u_S
C7 470P_C
C8 3300P_C
C9 0.1u_S
C10 0.1u_S
C11 0.1u_S
C12 0.1u_S
C13 0.1u_S
C14 0.01u_C
C15 0.01u_C
C16 0.1u_S
C17 0.01u_C
C18 0.1u_S
C19 0.1u_S
C20 470P_C
C21 3300P_C
C22 0.1u_S
C23 0.1u_S
C24 0.1u_S
C25 0.1u_S
C26 0.1u_S
C42 100P_C
C43 1000P_C
C44 1000P_C
C45 100P_C
C46 0.1u_S
C47 0.1u_S
C48 1000P_C
C49 1000P_C
R1 3300
R2 47
R3 10K
R4 200
R5 22K
R6 680
R7 330
R8 560
R9 1000
R10 1000
R11 1000
R12 10K
R13 100
R14 1800
R15 330
R16 820
R17 1000
R18 3300
R19 12K
R20 6200
R21 15K
R22 100
R23 56
R24 3900
R25 3300
R26 47
R27 10K
R28 200
R29 22K
R30 680
R31 330
R32 560
R33 1000
R34 1000
R35 1000
R36 10K
R37 100
R38 1800
R39 330
R40 820
R41 1000
R42 3300
R43 12K
R44 6200
R45 15K
R46 100
R47 56
R48 3900

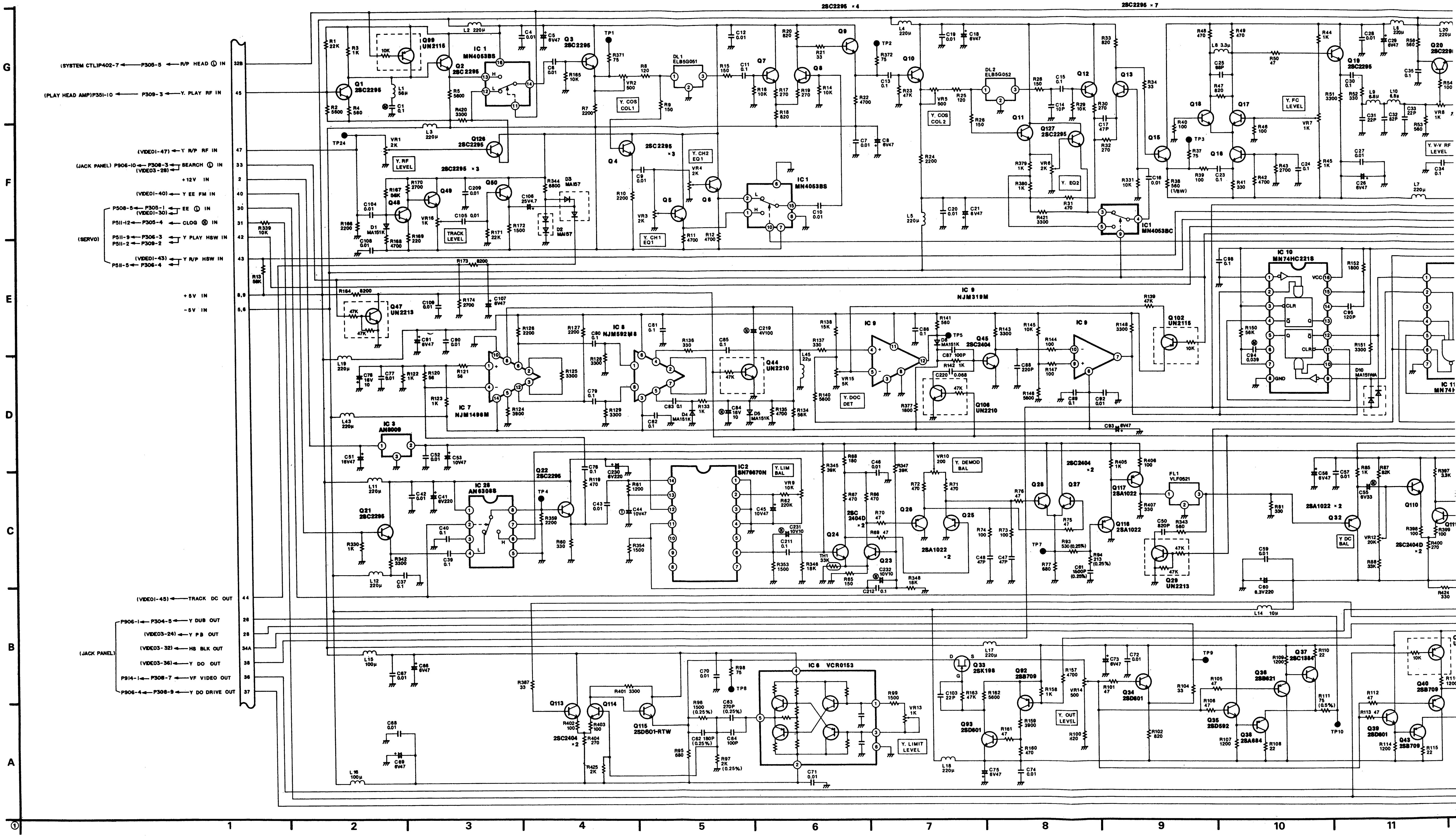
VFK0832 HEAD AMP SCEHMATIC DIAGRAM

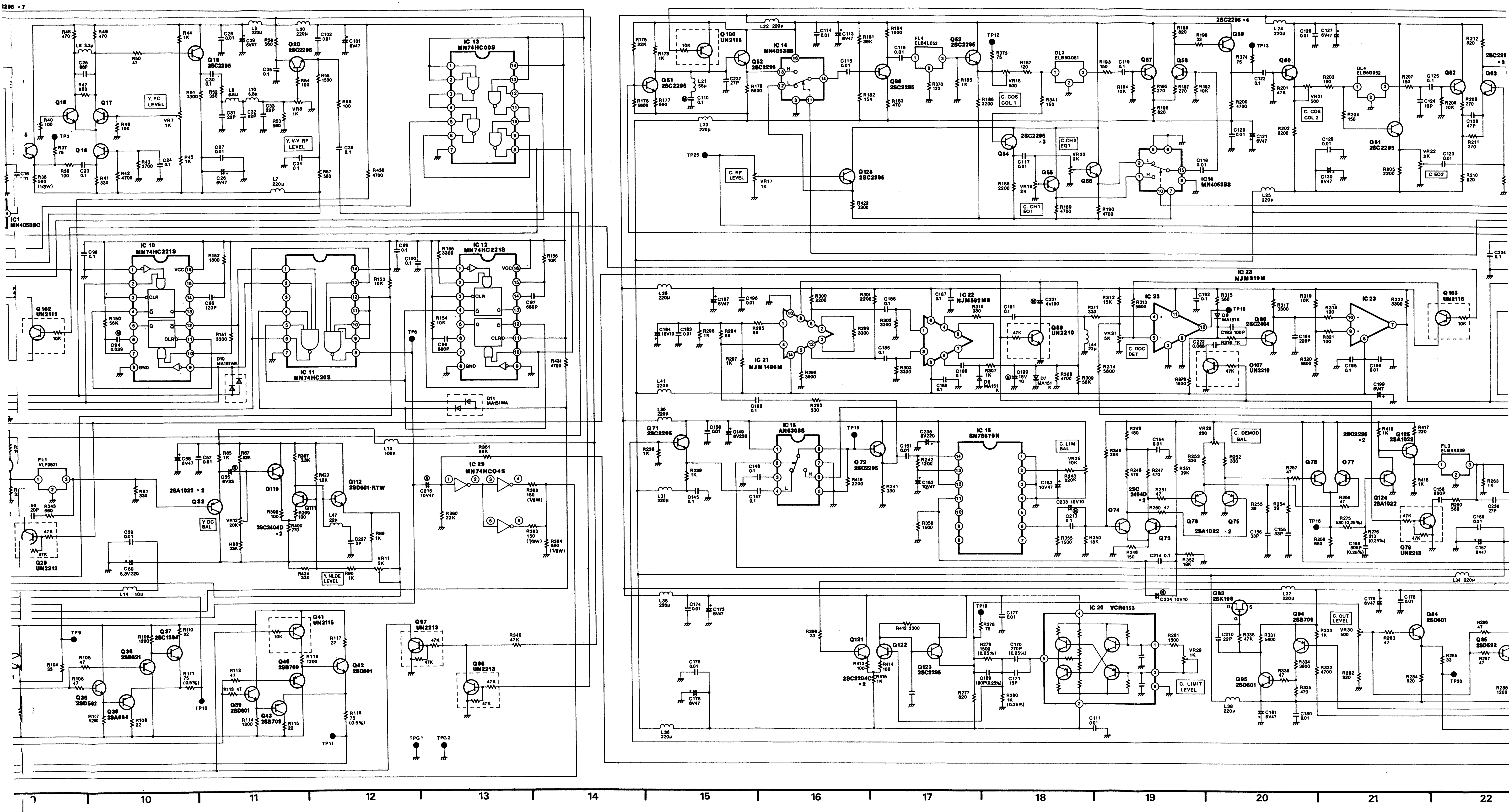

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
A
B
C
D
E
F
G
H
I
J
CN82
CN83
CN321
CN320
CN84
CN81
CN85
CN86
CN87
IC1 AN78N05
IC2 AN79N05
+7.5V
-7.5V
+5V
-5V
IC3
IC4
IC5
IC6
IC7
IC8
IC9
IC10
IC11
IC12
IC13
IC14
IC201
IC202
IC203
IC204
RY1
RY2
RY3
RY4
Y CH0
Y CH1
C CH0
C CH1
T1
T2
T3
T4
T5
T6
SW1
SW2
TP1
TP2
TP3
TP4
TP5
TP6
TP7
TP8
TPG1
TPG2
TPG3
0.01
0.001
0.001
DTC114EA
DTC114EA
DTC114EA
DTC114EA
+14.5V
+11.5V
Ⓐ
Ⓑ
Ⓒ
Ⓓ
DTC114EA
C
B
E
C114EA
E C B

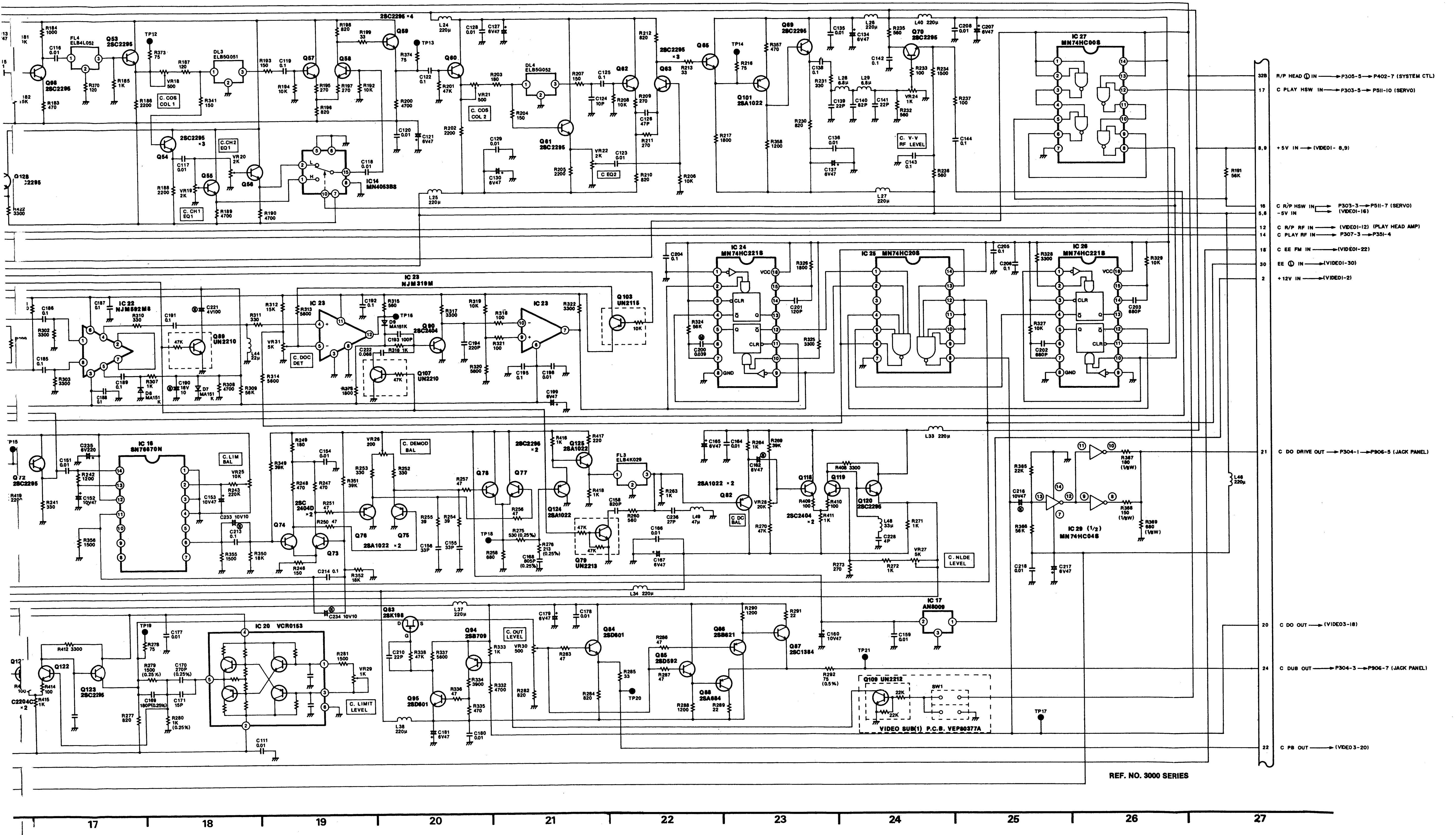
VFK0832 HEAD AMP CONNECTION SCHEMATIC DIAGRAM


C
B
A
1
2
3
4
5
6
OUTPUT TO REC AMP
CH0_OUT GREEN
CH1_OUT RED
INPUT FROM DRUM
CH0_IN GREEN
CH1_IN RED
P504
1 C_HEAD_CH1 (X)
2 C_HEAD_CH1 (Y)
3 GND
4 C_HEAD_CH2 (X)
5 C_HEAD_CH2 (Y)
6 GND
IL-S-6S-S2C2-S
P511
1 Y_HEAD_CH1 (X)
2 Y_HEAD_CH1 (Y)
3 GND
4 Y_HEAD_CH2 (X)
5 Y_HEAD_CH2 (Y)
6 GND
IL-S-6S-S2C2-S
RY3-7
RY3-6
GND
RY4-7
RY4-6
GND
RY1-7
RY1-6
GND
RY2-7
RY2-6
GND
CN86
1 C_HEAD_CH1 (X)
2 C_HEAD_CH1 (Y)
3 GND
4 C_HEAD_CH2 (X)
5 C_HEAD_CH2 (Y)
6 GND
IL-S-6P-S2T2-EF
CN85
1 Y_HEAD_CH1 (X)
2 Y_HEAD_CH1 (Y)
3 GND
4 Y_HEAD_CH2 (X)
5 Y_HEAD_CH2 (Y)
6 GND
IL-S-6P-S2T2-EF
CN81
1 +12V
2 +12V_2
3 CH0
4 GND
5 -12V
6 CH1
7 REC_RELAY
8 HEAD_CHA
9 HEAD_CHB
10 GND
11
IL-S-11S-S2C2-S
RA/HA
OUTPUT TO REC HEAD
CN1
CH0_IN 1
GND 9
CH1_IN 2
GND 10
3
+12V 11
+12V_2 4
GND 12
-12V 5
GND 13
REC_RELAY 6
HEAD_CHA 14
HEAD_CHB 7
15
8
HDAB-15S
HEAD AMP

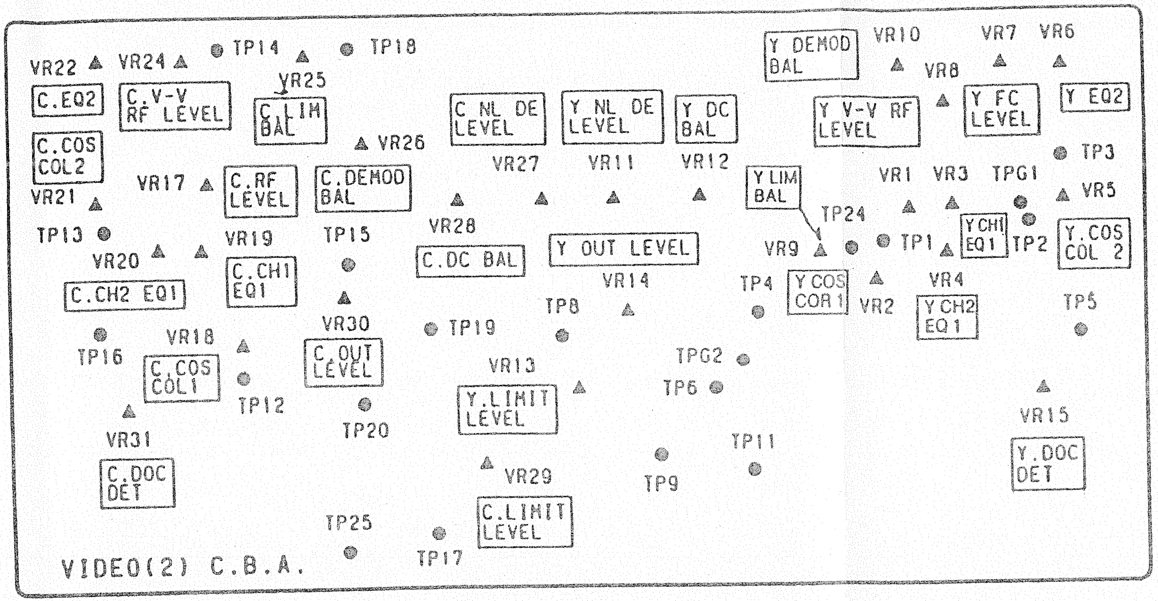
VFK0832 MODULATOR (VIDEO 2) SCHEMATIC DIAGRAM


(SYSTEM CTL)P402-7 ← P305-5 ← R/P HEAD Ⓛ IN 32B
(PLAY HEAD AMP)P351-10 ← P309-3 ← Y. PLAY RF IN 45
(VIDEO1-47) ← Y R/P RF IN 47
(JACK PANEL) P906-10 ← P308-3 ← SEARCH Ⓛ IN 33
(VIDEO3-28)
+12V IN 2
(VIDEO1-40) ← Y EE FM IN 40
P508-5 ← P305-1 ← EE Ⓛ IN 30
(VIDEO1-30)
P511-12 ← P305-4 ← CLOG Ⓡ IN 31
(SERVO)
P511-9 ← P306-3 ← Y PLAY HSW IN 42
P511-2 ← P309-2
(VIDEO1-43) ← Y R/P HSW IN 43
P511-5 ← P306-4
+5V IN 8,9
-5V IN 5,6
(VIDEO1-45) ← TRACK DC OUT 44
P906-1 ← P304-5 ← Y DUB OUT 26
(VIDEO3-24) ← Y PB OUT 28
(JACK PANEL)
(VIDEO3-32) ← HS BLK OUT 34A
(VIDEO3-36) ← Y DO OUT 38
P914-1 ← P308-7 ← VF VIDEO OUT 36
P906-4 ← P308-9 ← Y DO DRIVE OUT 37
IC 1 MN4053BS
IC1 MN4053BC
IC 3 AN6009
IC 7 NJM1496M
IC 8 NJM592M8
IC 9 NJM319M
IC 10 MN74HC221S
IC2 SN76670N
IC 28 AN6308S
IC 6 VCR0153
Y. RF LEVEL
TRACK LEVEL
Y. COS COL1
Y. COS COL2
Y. CH1 EQ1
Y. CH2 EQ1
Y. EQ2
Y. FC LEVEL
Y. V-V RF LEVEL
Y. DOC DET
Y. LIM BAL
Y. DEMOD BAL
Y DC BAL
Y. OUT LEVEL
Y. LIMIT LEVEL
G
F
E
D
C
B
A
1
2
3
4
5
6
7
8
9
10
11

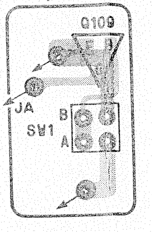

2295 ×7
IC 13 MN74HC00S
IC 10 MN74HC221S
IC 11 MN74HC20S
IC 12 MN74HC221S
IC1 MN4053BC
IC 29 MN74HC04S
Q18
Q17
Q16
TP3
Q19 2SC2295
Q20 2SC2295
Y. FC LEVEL
Y. V-V RF LEVEL
VR7 1K
VR8 1K
L6 220μ
L7 220μ
L20 220μ
Q102 UN2115
D10 MA151WA
D11 MA151WA
TP6
FL1 VLF0521
Q29 UN2213
Q32
2SA1022 ×2
Y DC BAL
Q110
Q111
Q112 2SD601-RTW
2SC2404D ×2
Y. NLDE LEVEL
VR11 5K
VR12 20K
L13 100μ
L14 10μ
Q35 2SD592
Q36 2SB621
Q37 2SC1384
Q38 2SA684
Q39 2SD601
Q40 2SB709
Q41 UN2115
Q42 2SD601
Q43 2SB709
Q97 UN2213
Q96 UN2213
TP9
TP10
TP11
TPG 1
TPG 2
Q100 UN2115
Q51 2SC2295
Q52 2SC2295
IC 14 MN4053BS
FL4 ELB4L052
Q98 2SC2295
Q53 2SC2295
TP12
DL3 ELB5G051
C. COS COL 1
Q57
Q58
Q59
2SC2295 ×4
TP13
Q60
DL4 ELB5G052
C. COS COL 2
Q61 2SC2295
Q62
Q63
2SC229 ×3
C EQ 2
VR21 500
VR22 2K
L22 220μ
L23 220μ
L24 220μ
L25 220μ
TP25
C. RF LEVEL
VR17 1K
Q128 2SC2295
Q54
2SC2295 ×3
Q55
Q56
C.CH2 EQ1
C. CH1 EQ1
VR19 2K
VR20 2K
IC14 MN4053BS
IC 23 NJM319M
IC 21 NJM1496M
IC 22 NJM592M8
Q89 UN2210
VR31 5K
C. DOC DET
D6 MA151
D7 MA151
D9 MA151K
TP16
Q90 2SC2404
Q107 UN2210
Q103 UN2115
L39 220μ
L41 220μ
L30 220μ
L31 220μ
Q71 2SC2295
IC 15 AN6308S
TP15
Q72 2SC2295
IC 16 SN76670N
C. LIM BAL
VR25 10K
C. DEMOD BAL
VR26 200
Q73
Q74
2SC 2404D ×2
Q75
Q76
2SA1022 ×2
Q77
Q78
2SC2295 ×2
Q124 2SA1022
Q125 2SA1022
FL3 ELB4K029
TP18
Q79 UN2213
L34 220μ
L35 220μ
L36 220μ
Q121
Q122
Q123 2SC2295
2SC2204C ×2
TP19
IC 20 VCR0153
VR29 1K
C. LIMIT LEVEL
Q83 2SK198
L37 220μ
L38 220μ
Q94 2SB709
C. OUT LEVEL
VR30 500
Q95 2SD601
Q84 2SD601
Q85 2SD592
TP20
9
10
11
12
13
14
15
16
17
18
19
20
21
22

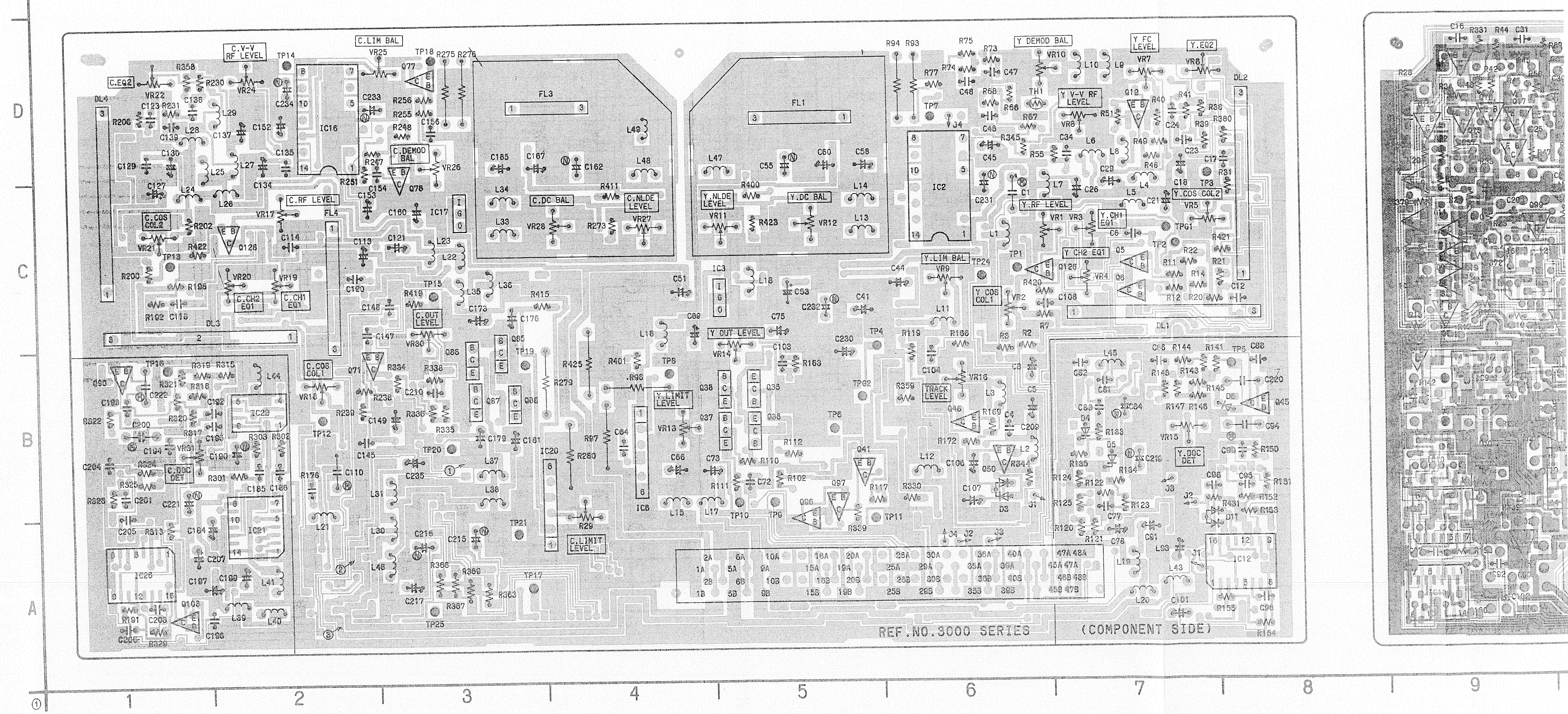

IC 27 MN74HC00S
IC 24 MN74HC221S
IC 25 MN74HC20S
IC 26 MN74HC221S
IC 23 NJM319M
IC 22 NJM592M8
IC 16 SN76670N
IC 20 VCR0153
IC 17 AN6009
IC14 MN4053BS
IC 29 (1/2) MN74HC04S
Q109 UN2212
VIDEO SUB(1) P.C.B. VEP80377A
C. COS COL 1
C. COS COL 2
C.CH2 EQ1
C. CH1 EQ1
C EQ2
C. V-V RF LEVEL
C. DOC DET
C. LIM BAL
C. DEMOD BAL
C. DC BAL
C. NLDE LEVEL
C. OUT LEVEL
C. LIMIT LEVEL
32B R/P HEAD ① IN → P305-5 → P402-7 (SYSTEM CTL)
17 C PLAY HSW IN → P303-5 → P511-10 (SERVO)
8,9 +5V IN → (VIDEO1- 8,9)
16 C R/P HSW IN → P303-3 → P511-7 (SERVO)
5,6 -5V IN → (VIDEO1-16)
12 C R/P RF IN → (VIDEO1-12) (PLAY HEAD AMP)
14 C PLAY RF IN → P307-3 → P351-4
18 C EE FM IN → (VIDEO1-22)
30 EE ① IN → (VIDEO1-30)
2 +12V IN → (VIDEO1-2)
21 C DO DRIVE OUT → P304-1 → P906-5 (JACK PANEL)
20 C DO OUT → (VIDEO3-18)
24 C DUB OUT → P304-3 → P906-7 (JACK PANEL)
22 C PB OUT → (VIDEO3-20)
REF. NO. 3000 SERIES
17
18
19
20
21
22
23
24
25
26
27

VFK0832 MODULATOR (VIDEO 2) P.C. BOARD


VR22
VR24
TP14
TP18
VR25
C.EQ2
C.V-V RF LEVEL
C.LIM BAL
VR26
C.COS COL2
VR21
VR17
C.RF LEVEL
C.DEMOD BAL
TP13
VR19
TP15
VR20
C.CH1 EQ1
C.CH2 EQ1
VR30
TP16
VR18
C.OUT LEVEL
C.COS COL1
TP12
VR31
TP20
C.DOC DET
TP25
TP17
VIDEO(2) C.B.A.
C NL DE LEVEL
Y NL DE LEVEL
Y DC BAL
VR27
VR11
VR12
VR28
C.DC BAL
Y OUT LEVEL
VR14
TP8
TP19
VR13
Y.LIMIT LEVEL
VR29
C.LIMIT LEVEL
TP9
TP11
TPG2
TP6
Y DEMOD BAL
VR10
VR7
VR6
VR8
Y V-V RF LEVEL
Y FC LEVEL
Y EQ2
TP3
Y LIM BAL
VR1
VR3
TPG1
VR5
TP24
VR9
TP1
Y CH1 EQ1
TP2
Y.COS COL 2
TP4
Y COS COR 1
VR2
VR4
Y CH2 EQ1
TP5
VR15
Y.DOC DET

※ VIDEO 2 SUB (1) P.C.B. (VEP80377A)


Q109
JA
SW1
B
A


E
D
C
B
A
①
1
2
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6
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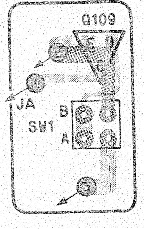
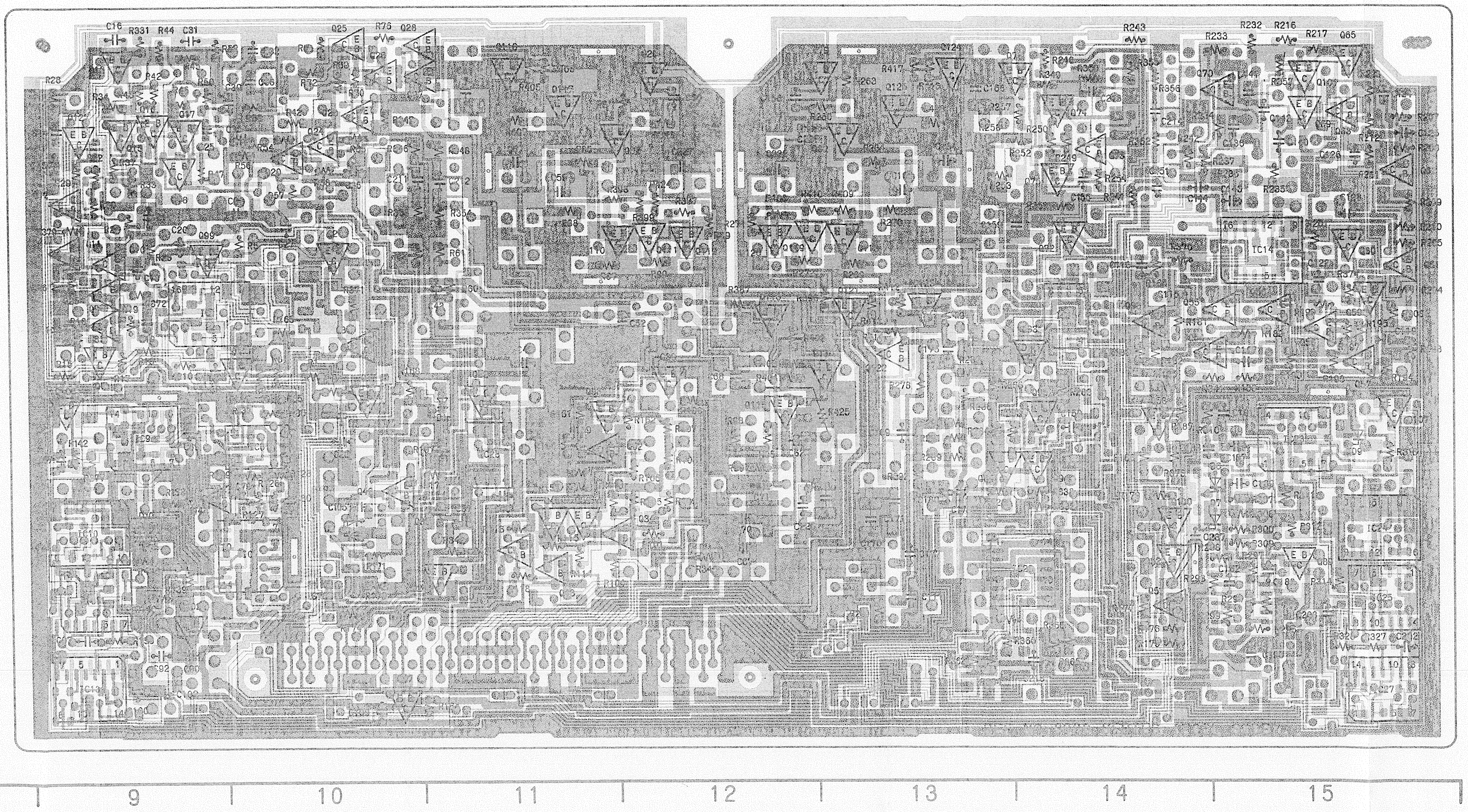
8
9
FL1
FL3
FL4
IC2
IC3
IC6
IC12
IC16
IC17
IC20
IC21
IC22
IC26
DL1
DL2
DL3
DL4
C.EQ2
C.V-V RF LEVEL
C.LIM BAL
C.DEMOD BAL
C.RF LEVEL
C.COS COL2
C.CH2 EQ1
C.CH1 EQ1
C.OUT LEVEL
C.COS COL1
C.DOC DET
C.DC BAL
C.NLDE LEVEL
C.LIMIT LEVEL
Y.NLDE LEVEL
Y.DC BAL
Y OUT LEVEL
Y.LIMIT LEVEL
TRACK LEVEL
Y DEMOD BAL
Y FC LEVEL
Y.EQ2
Y V-V RF LEVEL
Y.RF LEVEL
Y.CH1 EQ1
Y.COS COL2
Y.LIM BAL
Y CH2 EQ1
Y COS COL1
Y.DOC DET
REF.NO.3000 SERIES
(COMPONENT SIDE)

※ VIDEO 2 SUB (1)
P.C.B. (VEP80377A)



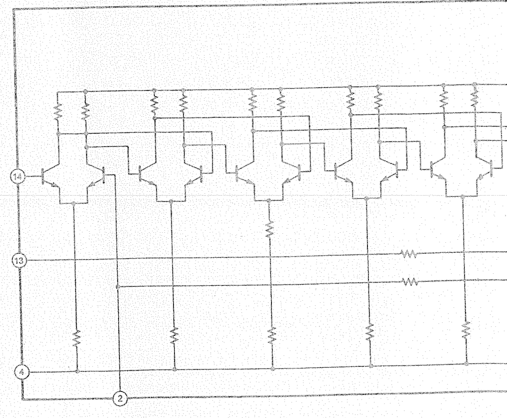


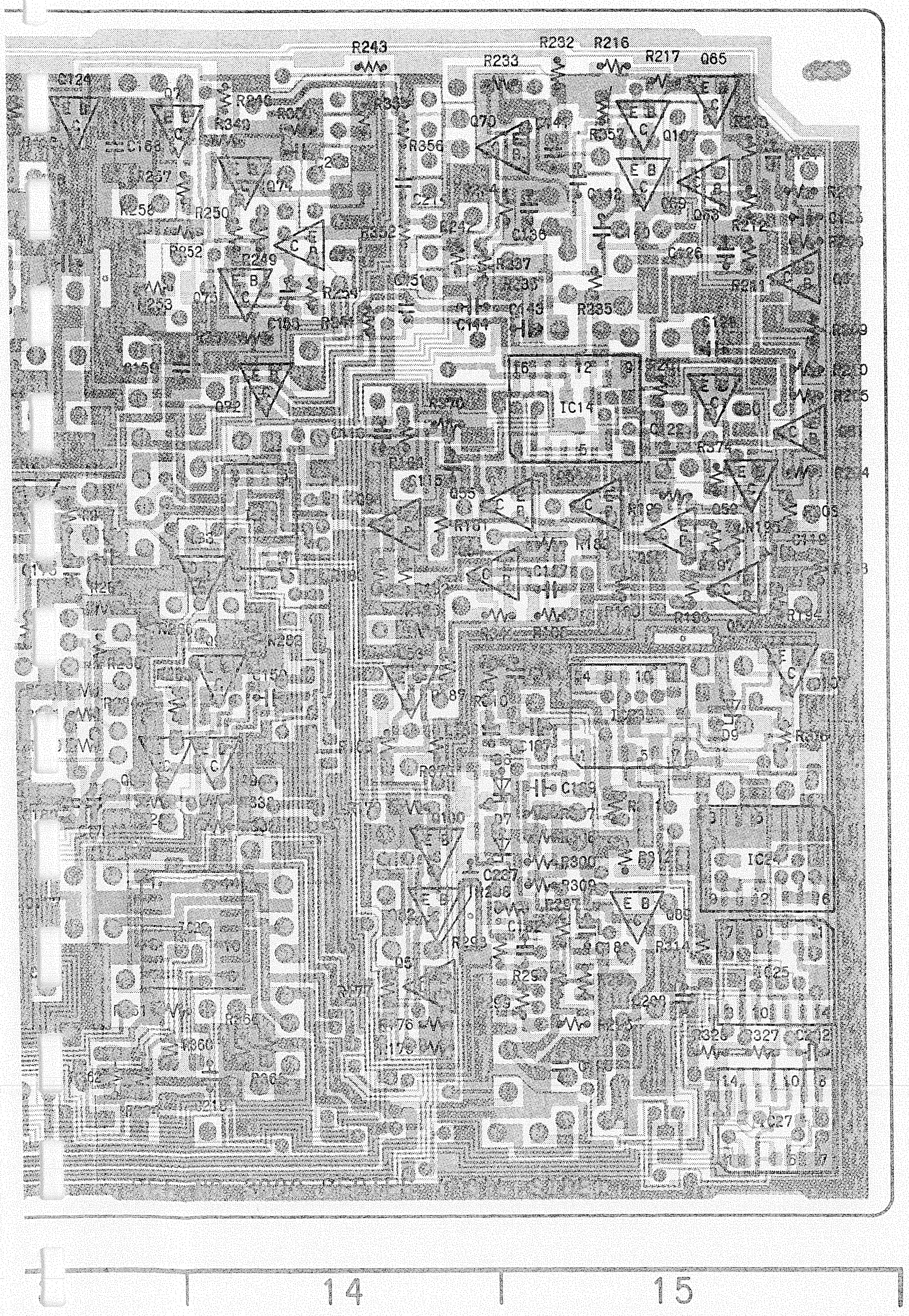
VIDEO (2) P.C.B.

Transistor			
Q3001	C-10	Q3076	C-3
Q3002	C-10	Q3077	D-3
Q3003	C-10	Q3078	D-14
Q3004	C-10	Q3079	D-13
Q3005	C-7	Q3082	D-13
Q3006	C-7	Q3083	C-14
Q3007	C-9	Q3084	B-13
Q3008	C-9	Q3085	C-3
Q3009	C-9	Q3086	B-3
Q3010	C-9	Q3087	B-3
Q3011	C-9	Q3088	B-3
Q3012	C-9	Q3089	B-15
Q3013	D-9	Q3090	B-1
Q3015	D-9	Q3092	B-12
Q3016	D-9	Q3093	B-11
Q3017	D-9	Q3094	B-14
Q3018	C-9	Q3095	B-14
Q3019	D-7	Q3096	B-5
Q3020	D-10	Q3097	B-5
Q3021	A-10	Q3098	C-14
Q3022	C-11	Q3099	C-9
Q3023	D-10	Q3100	B-14
Q3024	D-10	Q3101	D-15
Q3025	D-10	Q3102	A-9
Q3026	D-10	Q3103	A-1
Q3027	D-10	Q3106	B-9
Q3028	D-10	Q3107	B-15
Q3029	D-12	Q3109	E-9
Q3032	D-12	Q3110	C-11
Q3033	C-12	Q3111	C-12
Q3034	B-12	Q3112	C-12
Q3035	B-5	Q3113	C-12
Q3036	B-5	Q3114	C-13
Q3037	B-4	Q3115	B-12
Q3038	B-4	Q3116	D-11
Q3039	B-11	Q3117	D-11
Q3040	B-11	Q3118	C-13
Q3041	B-5	Q3119	C-12
Q3042	B-11	Q3120	C-12
Q3043	A-11	Q3121	C-13
Q3044	B-9	Q3122	C-13
Q3045	B-8	Q3123	C-13
Q3047	A-10	Q3124	D-13
Q3048	B-6	Q3125	D-13
Q3049	B-10	Q3126	C-7
Q3050	B-6	Q3127	D-9
Q3051	A-14	Q3128	C-2
Q3052	B-14	**Integrated Circuit**	
Q3053	B-14	IC3001	C-9
Q3054	C-14	IC3002	C-6
Q3055	C-14	IC3003	C-5
Q3056	C-15	IC3006	B-4
Q3057	C-15	IC3007	B-1
Q3058	C-15	IC3008	B-1
Q3059	C-15	IC3009	B-9
Q3060	C-15	IC3010	B-9
Q3061	C-15	IC3011	A-9
Q3062	D-15	IC3012	A-8
Q3063	D-15	IC3013	A-9
Q3065	D-15	IC3014	C-1
Q3069	D-15	IC3015	C-1
Q3070	D-15	IC3016	D-2
Q3071	B-2	IC3017	C-3
Q3072	C-14	IC3020	B-4
Q3073	D-14	IC3021	A-2
Q3074	D-14	IC3022	B-2
Q3075	D-14	IC3023	B-1

ADDRESS INFORMATION

SN76670N





VIDEO (2) P.C.B.

Transistor

Q3001	C-10
Q3002	C-10
Q3003	C-10
Q3004	C-10
Q3005	C-7
Q3006	C-7
Q3007	C-9
Q3008	C-9
Q3009	C-9
Q3010	C-9
Q3011	C-9
Q3012	C-9
Q3013	D-9
Q3015	D-9
Q3016	D-9
Q3017	D-9
Q3018	C-9
Q3019	D-7
Q3020	D-10
Q3021	A-10
Q3022	C-11
Q3023	D-10
Q3024	D-10
Q3025	D-10
Q3026	D-10
Q3027	D-10
Q3028	D-10
Q3029	D-12
Q3032	D-12
Q3033	C-12
Q3034	B-12
Q3035	B-5
Q3036	B-5
Q3037	B-4
Q3038	B-4
Q3039	B-11
Q3040	B-11
Q3041	B-5
Q3042	B-11
Q3043	A-11
Q3044	B-9
Q3045	B-8
Q3047	A-10
Q3048	B-6
Q3049	B-10
Q3050	B-6
Q3051	A-14
Q3052	B-14
Q3053	B-14
Q3054	C-14
Q3055	C-14
Q3056	C-15
Q3057	C-15
Q3058	C-15
Q3059	C-15
Q3060	C-15
Q3061	C-15
Q3062	D-15
Q3063	D-15
Q3065	D-15
Q3069	D-15
Q3070	D-15
Q3071	B-2
Q3072	C-14
Q3073	D-14
Q3074	D-14
Q3075	D-14
Q3076	C-3
Q3077	D-3
Q3078	D-14
Q3079	D-13
Q3082	D-13
Q3083	C-14
Q3084	B-13
Q3085	C-3
Q3086	B-3
Q3087	B-3
Q3088	B-3
Q3089	B-15
Q3090	B-1
Q3092	B-12
Q3093	B-11
Q3094	B-14
Q3095	B-14
Q3096	B-5
Q3097	B-5
Q3098	C-14
Q3099	C-9
Q3100	B-14
Q3101	D-15
Q3102	A-9
Q3103	A-1
Q3106	B-9
Q3107	B-15
Q3109	E-9
Q3110	C-11
Q3111	C-12
Q3112	C-12
Q3113	C-12
Q3114	C-13
Q3115	B-12
Q3116	D-11
Q3117	D-11
Q3118	C-13
Q3119	C-12
Q3120	C-12
Q3121	C-13
Q3122	C-13
Q3123	C-13
Q3124	D-13
Q3125	D-13
Q3126	C-7
Q3127	D-9
Q3128	C-2

Integrated Circuit

IC3001	C-9
IC3002	C-6
IC3003	C-5
IC3006	B-4
IC3007	B-10
IC3008	B-10
IC3009	B-9
IC3010	B-9
IC3011	A-9
IC3012	A-8
IC3013	A-9
IC3014	C-15
IC3015	C-14
IC3016	D-2
IC3017	C-3
IC3020	B-4
IC3021	A-2
IC3022	B-2
IC3023	B-15
IC3024	B-15
IC3025	A-15
IC3026	A-1
IC3027	A-15
IC3028	B-11
IC3029	B-14

Test Point

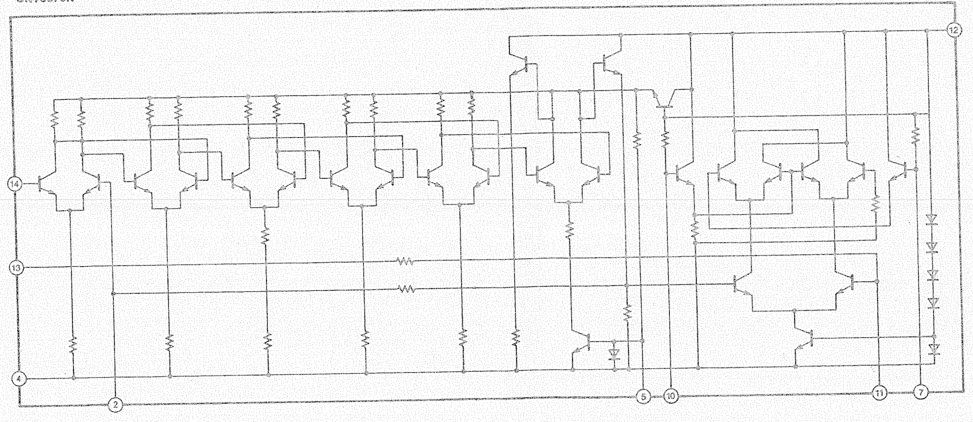
TP3001	C-6
TP3002	C-7
TP3003	C-7
TP3004	C-5
TP3005	B-8
TP3006	B-5
TP3007	D-6
TP3008	B-4
TP3009	A-5
TP3010	A-5
TP3011	A-6
TP3012	B-2
TP3013	C-1
TP3014	D-2
TP3015	C-3
TP3016	B-1
TP3017	A-3
TP3018	D-3
TP3019	B-3
TP3020	B-3
TP3021	A-3
TP3024	C-6
TP3025	A-3
TPG3001	C-7
TPG3002	B-5

Adjustement

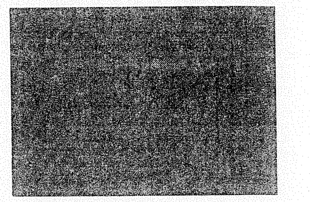
VR3001	C-7
VR3002	C-6
VR3003	C-7
VR3004	C-7
VR3005	C-7
VR3006	D-7
VR3007	D-7
VR3008	D-7
VR3009	C-6
VR3010	D-6
VR3011	C-5
VR3012	C-5
VR3013	B-4
VR3014	B-5
VR3015	B-7
VR3016	B-6
VR3017	C-2
VR3018	B-2
VR3019	C-2
VR3020	C-2
VR3021	C-1
VR3022	D-1
VR3024	D-2
VR3025	D-3
VR3026	D-3
VR3027	C-4
VR3028	C-4
VR3029	A-4
VR3030	C-3
VR3031	B-1

ADDRESS INFORMATION

SN76670N



VIDEO 2 WAVEFORMS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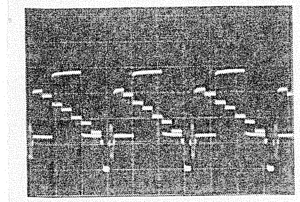
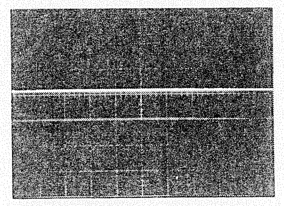

TP9
500mV/20μsec. div.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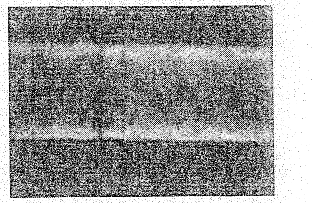
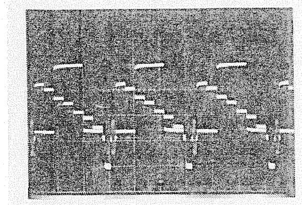
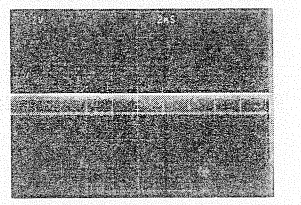
500mV/5msec. div.


TP2 PLAY
100mV/2msec. div.


TP10
500mV/20μsec. div.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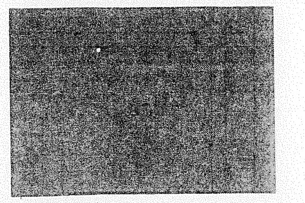
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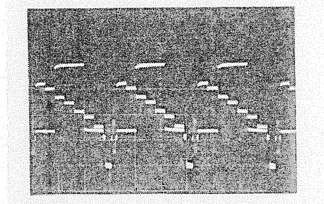
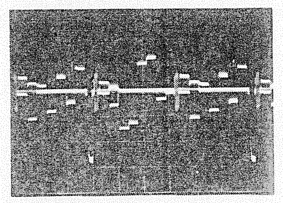
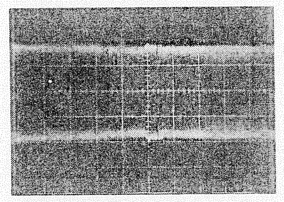
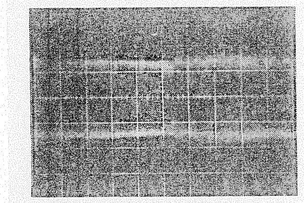
100mV/2msec. div.


TP11
500mV/20μsec. div.


TP19
500mV/10μsec. div.


TP4 PLAY
100mV/2msec. div.


TP12 PLAY
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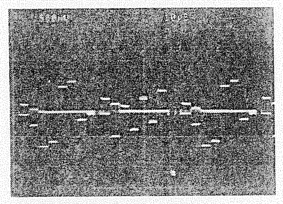
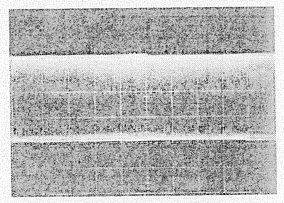
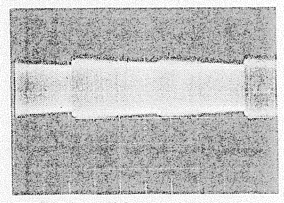
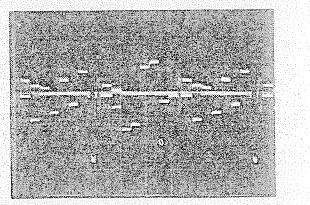
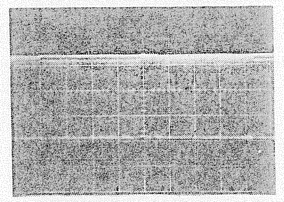

TP20
500mV/10μsec. div.


TP5 PLAY
500mV/2msec. div.


TP13 PLAY
200mV/5msec. div.


TP21
500mV/10μsec. div.


TP7 PLAY
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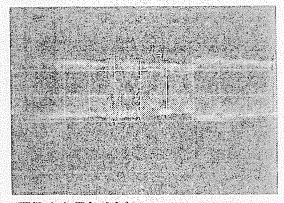
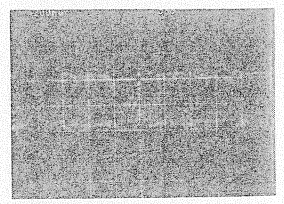
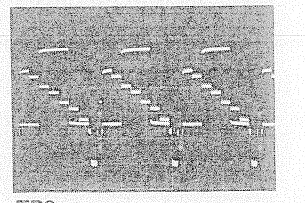

TP14 PLAY
200mV/5msec. div.


TP24
200mV/5msec. div.


TP8
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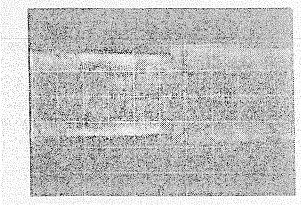
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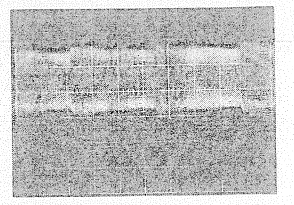
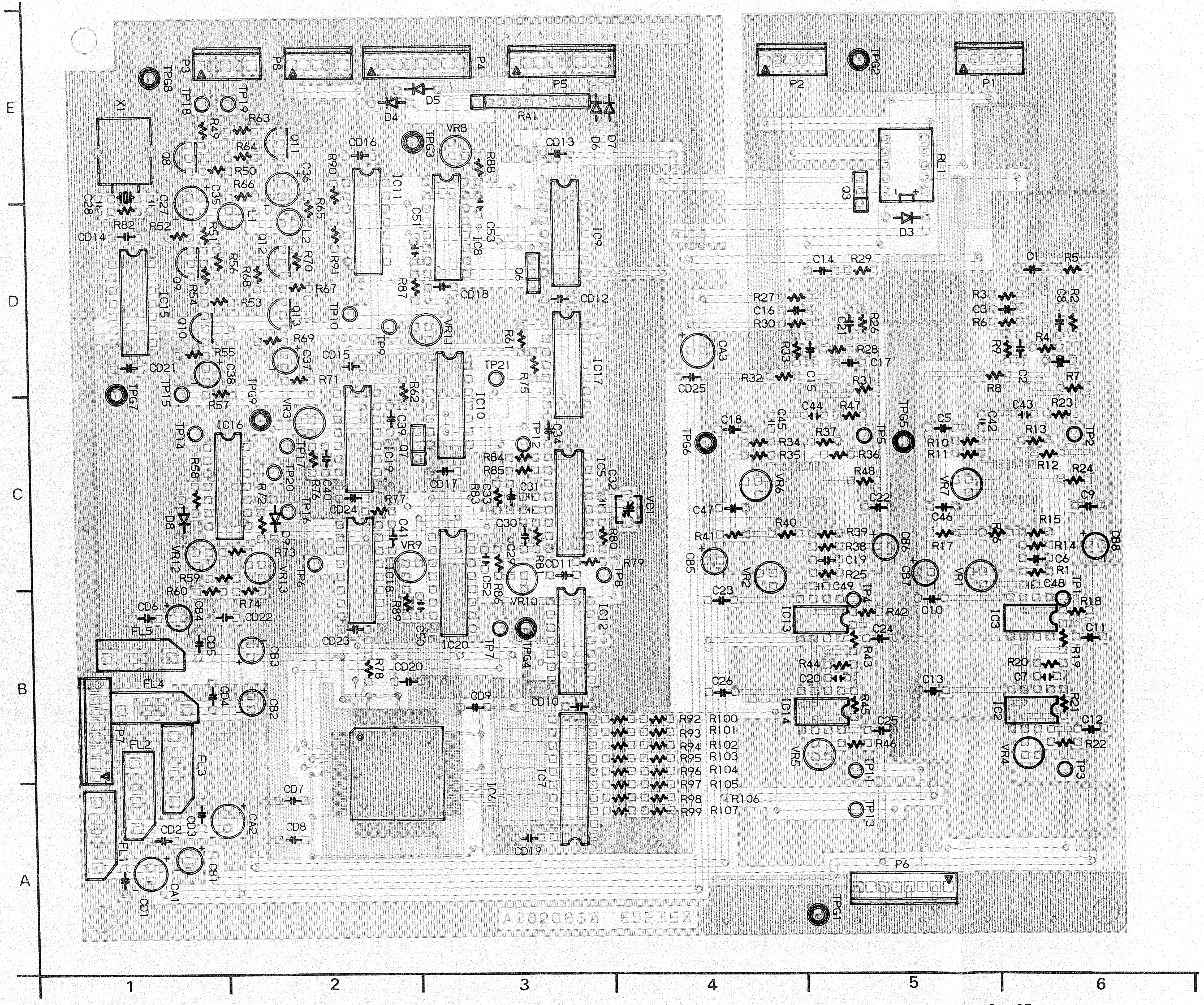

TP25
500mV/5msec. div.

VFK0832 AZIMUTH & DETECTION P.C. BOARD


AZIMUTH and DET
E
D
C
B
A
1
2
3
4
5
6
P1
P2
P3
P4
P5
P6
P7
P8
X1
RA1
RL1
IC2
IC3
IC5
IC6
IC7
IC8
IC9
IC10
IC11
IC12
IC13
IC14
IC15
IC16
IC17
IC18
IC19
IC20
Q1
Q3
Q6
Q7
Q8
Q9
Q10
Q11
Q12
Q13
D3
D4
D5
D6
D7
D8
D9
VR1
VR2
VR3
VR4
VR5
VR6
VR7
VR8
VR9
VR10
VR11
VR12
VR13
VC1
FL1
FL2
FL3
FL4
FL5
L1
L2
CA1
CA2
CA3
CB1
CB2
CB3
CB4
CB5
CB6
CB7
CB8
TPG1
TPG2
TPG3
TPG4
TPG5
TPG6
TPG7
TPG8
TPG9
TP1
TP2
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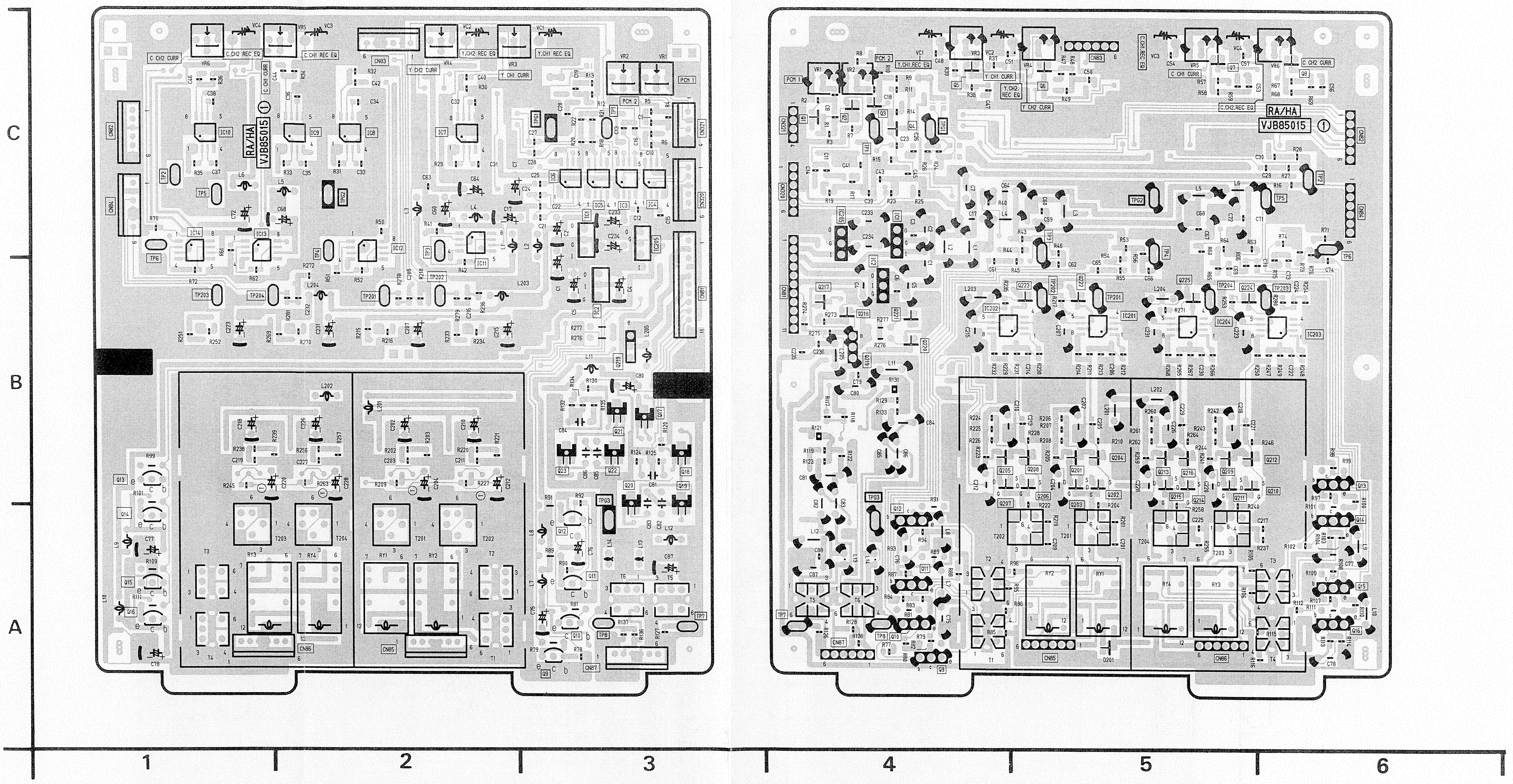
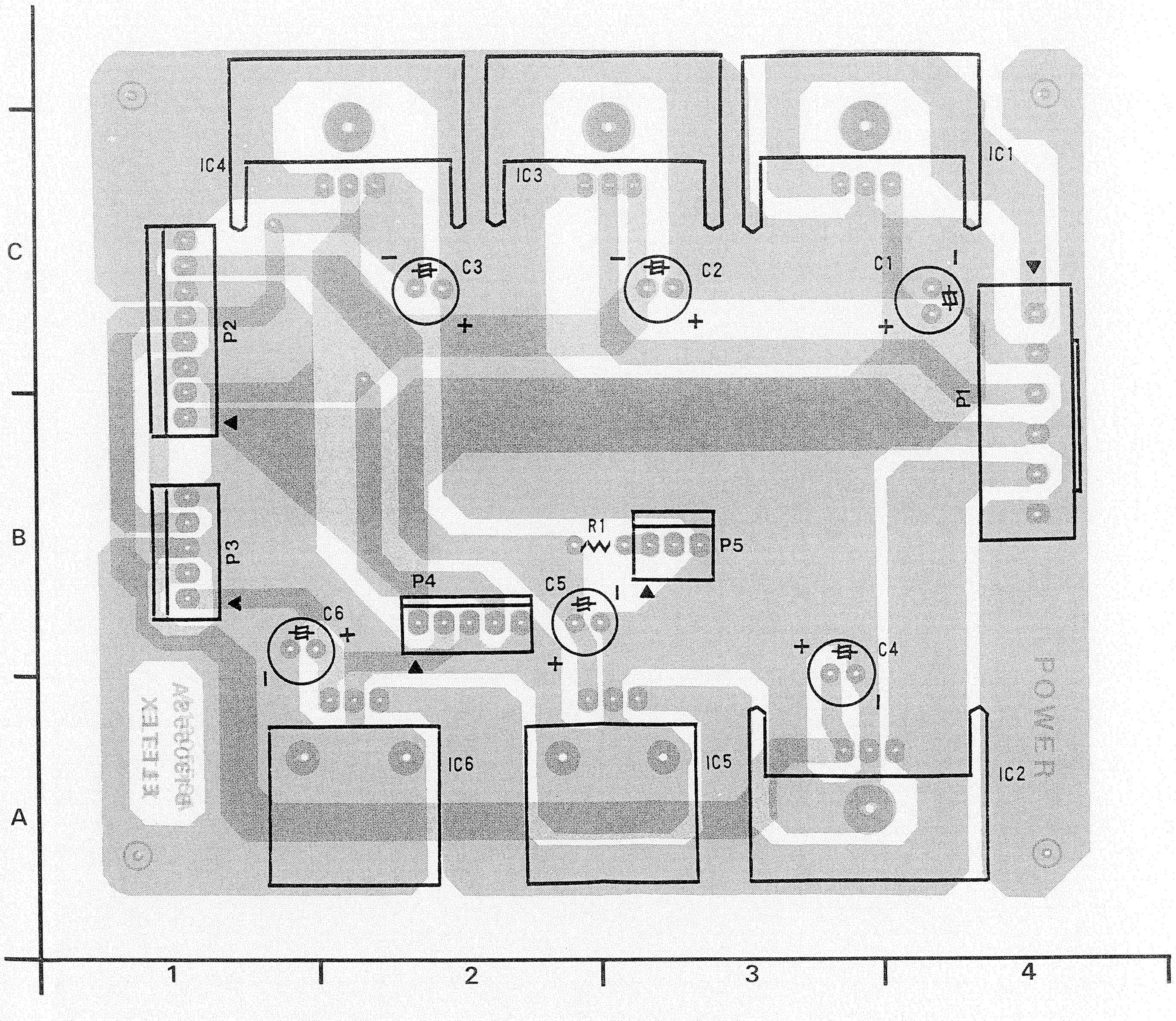
TP5
TP6
TP7
TP8
TP9
TP10
TP11
TP12
TP13
TP14
TP15
TP16
TP17
TP18
TP19
TP20
TP21
R92
R93
R94
R95
R96
R97
R98
R99
R100
R101
R102
R103
R104
R105
R106
R107
A20208SA

VFK0832 HEAD AMP P.C. BOARD


C
B
A
1
2
3
4
5
6
RA/HA
VJB85015 ①
C CH2 CURR
C.CH2 REC EQ
C.CH1 REC EQ
C CH1 CURR
Y CH2 CURR
Y.CH2 REC EQ
Y CH1 CURR
Y.CH1 REC EQ
PCM 1
PCM 2
CN81
CN82
CN83
CN84
CN85
CN86
CN87
RY1
RY2
RY3
RY4

VFK0832 POWER SUPPLY P.C. BOARD


IC4
IC3
IC1
C3
C2
C1
P2
P1
P3
R1
P5
P4
C5
C6
C4
IC6
IC5
IC2
POWER
C
B
A
1
2
3
4

Technical Descriptions

Panasonic
Broadcast Systems

ORDER NO. VSD9106M003-1
D5

Technical Guide

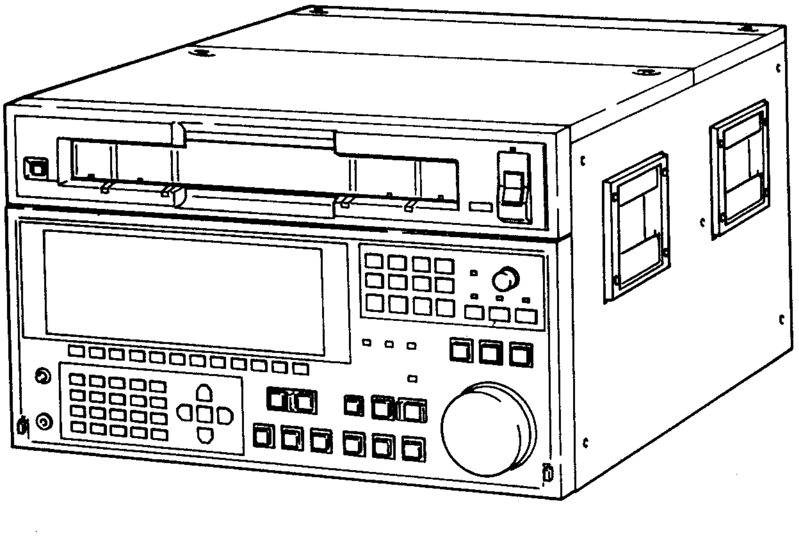
Vol 1-2

AJ-D350

1/2" DIGITAL

(PAL/NTSC)

This Technical Guide describes the Format, Mechanism and Theory of Operation of the AJ-D350.
This Technical Guide is written as basic guidance for both sales and service staff.



Panasonic

Matsushita Electric Industrial Co., Ltd.
Audio and Video Systems Division

Contents

1. Specification -------------------------------- 2
2. Introduction --------------------------------- 6
3. Tape Format ---------------------------------- 7
4. Structure of Head ---------------------------- 9
5. Cassette Tape -------------------------------- 10
6. Mechanism ------------------------------------ 11
7. Audio Video Overall -------------------------- 17
8. Error Correction and Error Concealment ------ 20
9. PCM Audio Error Correction ------------------- 21
10. Video Circuit ------------------------------ 22
11. Audio Circuit ------------------------------ 39
12. System Control and Front Panel ------------- 45
13. Servo Circuit ------------------------------ 50
14. Auto Tracking ------------------------------ 58
15. Diagnostics Overview ----------------------- 65

1-1. Specifications (PAL)

General

Power requirement:	AC 100 to 120V, AC 200V to 240V ± 10% 50/60 Hz
Power consumption:	Max 450W
Operating Temperature:	5°C to 40°C (41°F to 104°F)
Humidity:	10% to 90% (non-condensing)
Weight:	Approx. 48kg (106lbs)
Dimensions:	Approx. 424 (W) x 265 (H) x 667 (D) mm Including handles and feet
Recording format:	D3 (1/2" DIGITAL)
Tracks/channels:	Digital video and audio(4 channels):8 tracks/field
Analog audio (cue):	1 track Time code: 1 track
CTL:	1 track
Tape speed:	83.88mm/sec
Writing speed: (Relative speed)	23.79m/sec
Record time (max):	S cassette 50 min. (14µm) 64 min. (11µm) M cassette 95 min. (14µm) 125 min. (11µm) L cassette 185 min. (14µm) 245 min. (11µm)

note : 11µm tape will be shipped after middle of 1992.

Cassette type:	1/2" Digital cassette (S, M or L)
Recommended tape:	Metal (1,500 Oe) tape or AJ-TD series
Servo lock:	within 1.5 sec (with color frame capstan servo lock mode from stand by mode)
Tape timer accuracy:	±1 frames (with continuous CTL signal)
Edit accuracy:	±0 frames (with time code)
Error correction:	Correction and concealment (Reed-Solomon code)
Fast forward/rewind time:	Within 90 sec. (with 90 minute tape)
Load/unload time:	Within 5 sec.
Cueing:	Within 5 sec. (30 sec. spot)

VIDEO

Video signal:	Composite Video
Sampling Frequency:	4 Fsc, 17.73 MHz
Quantization:	8 bit/135, 45, -45, -135 degrees sampling
Channel coding:	New 8 to 14 modulation
Recorded Samples/Line:	948
Recorded Lines/Field:	304
Frequency range:	25Hz to 6.0MHz ±0.5dB at 7.5MHz 0dB/-3dB
S/N ratio:	54 dB
Differential gain:	less than 2 %
Differential phase:	less than 1°
Moire:	0
Y/C delay:	less than 15 nsec
Tilt(Horizontal&Vertical):	Less than 1%
Low frequency linearity:	Less than 2% (including quantization noise)
K Factor:	Less than 1% (2T pulse)
Output SCH phase:	Based upon CCIR 624-3
Input level adjustable range:	± 3 dB (analog input only)
Out put adjustment	
Video Gain:	-∞ to + 3 dB
Chroma Gain:	-∞ to + 3 dB
Chroma Phase:	± 15 degrees
Setup:	± 15 IRE
Video Phase:	± 1.8 µsec (280 nsec/step)
SC Phase :	more than 360 degrees

Spacifications subject to change without notice.

DIGITAL AUDIO (DA 1 to 4 channels)

Sampling Frequency:	48 kHz (synchronized to video)
Quantization:	20 bit/sample
Frequency characteristic:	20Hz to 20kHz ±0.5 dB
Dynamic range:	More than 95 dB (at 1kHz, emphasis off "A" weighted)
Distortion:	Less than 0.03% (at 1kHz, emphasis OFF operating level)
Crosstalk:	Less than -80 dB (at 1kHz, between any two channels)
Wow & Flutter:	Below measurable limit
Headroom:	20 dB
Operating level:	+8, +4, 0, -20 dBu selectable (LINE IN/OUT)
Emphasis:	T_1=50µsec,/ T_2=15µsec (ON/OFF selectable)
Input/ output gain range:	-∞ to +12 dB

Analog audio (Cue track)

Frequency response:	100Hz to 12kHz ±3 dB
S/N ratio:	Better than 44dB (at 1 kHz, 3% distortion)
Distortion	Less than 2% (1KHz reference signal)
Wow & flutter:	Less than 0.15% (DIN weighted)
Operating level:	+8, +4, 0, -20dBu(LINE IN/OUT), -60 dBu (LINE IN) selectable
Input/output gain range:	-∞ to +12 dB

Input/output signal

Video

Input		
Analog:	1.0 ± 0.3Vp-p, 75ohms	(BNC)
Digital:	10 bit parallel	(25P)
Reference:	Composite (Black burst) signal	(BNC)
	Sync & burst 0.3 Vp-p, 75ohms	(BNC)
Output		
Analog:	VIDEO1 (VBS/VB/VS/V switchable)	(BNC)
	VIDEO2 (VBS)	(BNC)
	VIDEO3 (Character ON/OFF)	(BNC)
Digital:	10 bit parallel	(25P)

Audio

Input		
Analog (CH1,2,3,4):	Max. +28 dBu 150 ohms/600 ohms/high impedance switchable	(XLR)x4
Digital (CH1/2,3/4):	AES/EBU format	(XLR)x2
Cue Line in:	Max. +18 dBu 150 ohms/600 ohms/high impedance switchable	(XLR)
Output		
Analog (CH1,2,3,4):	Max. +28 dBu low impedance	(XLR)x4
Digital (CH1/2,3/4):	AES/EBU format	(XLR)x2
Cue:	Max. +18 dBu low impedance	(XLR)x1
Monitor L/R:	Max, +24 dBu low impedance	(XLR)x2
Headphones:	Variable level control by VR	(M6)

General

Colour Frame pulse in/out:	TTL level	(BNC)
WFM out:	75 ohms Video/CTL/RF ENV CH0 or ENV CH1) (selectable)	(BNC)
Time code		
Input:	2.4V ± 1.4Vp-p,10k ohms, balanced	(XLR)
Output:	2.4Vp-p, low impedance, balanced	(XLR)
Remote		
Remote-in:	For 9-pin RS-422A interface	(9pin)
Remote-out:	For 9-pin RS-422A interface	(9pin)
Remote-in/out:	For 9-pin RS-422A interface	(9pin)
RS-232C:	For RS-232C interface	(25pin)
GP-IB:	For GP-IB (IEEE-488) interface	(25pin)
Parallel I/O:	For parallel communication	(50pin)
V/A control:	For video and audio remote control	(15pin)
AUX:	For future use (not used)	(15pin)

1-2. Specifications (NTSC)

General

Power requirement:	AC 100 to 120V, AC 200V to 240V ± 10% 50/60 Hz
Power consumption:	Max 450W
Operating Temperature:	5°C to 40°C (41°F to 104°F)
Humidity:	10% to 90% (non-condensing)
Weight:	Approx. 48kg (106lbs)
Dimensions:	Approx. 424 (W) x 265 (H) x 667 (D) mm Including handles and feet
Recording format:	D3 (1/2″ DIGITAL)
Tracks/channels:	Digital video and audio(4 channels):6 tracks/field
Analog audio (cue):	1 track
Time code:	1 track
CTL:	1 track
Tape speed:	83.88mm/sec
Writing speed: (Relative speed)	21.4m/sec
Record time (max):	S cassette 50 min. (14µm) 64 min. (11µm) M cassette 95 min. (14µm) 125 min. (11µm) L cassette 185 min. (14µm) 245 min. (11µm)

note: 11µm tape will be shipped after middle of 1992.

Cassette type:	1/2" Digital cassette (S, M or L)
Recommended tape:	Metal (1500 Oe) tape or AJ-TD series
Servo lock time:	Within 1.0 sec (with color frame capstan servo lock mode from stand by mode)
Tape timer accuracy:	±1 frames (with continuous CTL signal)
Edit accuracy:	±0 frames (with time code)
Error correction:	Correction and concealment (Reed-Solomon code)
Fast forward/rewind time:	Within 90 sec. (with 90 minute tape)
Load/unload time:	Within 5 sec.
Cueing:	Within 5 sec. (30 sec. spot)

VIDEO

Video signal:	Composite Video
Sampling Frequency:	4 Fsc, 14.32 MHz
Quantization:	8 bits/123, 33, −57, −147 (I, Q axis sampling) degrees
Channel coding:	New 8 to 14 modulation
Recorded Samples/Line:	768
Recorded Lines/Field:	255
Frequency characteristic	30Hz to 5.5MHz ±0.5dB at 6.2MHz 0dB/-3dB
S/N ratio:	54 dB
Differential gain:	less than 2 %
Differential phase:	less than 1°
Moire:	0
Y/C delay:	less than 15 nsec
Tilt(Horizontal&Vertical):	Less than 1%
Low frequency linearity:	Less than 2% (including quantization noise)
K Factor:	Less than 1%
Output SCH phase:	Based upon RS-170A
Input level adjustable range:	± 3 dB (analog input only)

Output Adjustment

Video Gain:	-∞ to + 3 dB
Chroma Gain:	-∞ to + 3 dB
Chroma Phase (Hue):	± 15 degrees
Setup:	± 15 IRE
Video Phase:	± 2.2 µsec (280 nsec/step)
SC Phase :	more than 360 degrees

Specification subject to change without notice.

DIGITAL AUDIO (DA 1 to 4 channels)

Sampling Frequency: 48 kHz (synchronized to video)
Quantization: 20 bit/ sample
Frequency characteristic: 20Hz to 20kHz ±0.5 dB
Dynamic range: More than 95 dB (at 1kHz, emphasis off, "A" weighted)
Distortion: Less than 0.03% (at 1kHz, emphasis OFF operating level)
Crosstalk: Less than -80 dB (at 1kHz, between any two channels)
Wow & Flutter: Below measurable limit
Headroom: 20 dB
Operating level: +8, +4, 0, -20 dBm selectable (LINE IN/OUT)
Emphasis: T_1=50µsec,/ T_2=15µsec (ON/OFF selectable)
Input/ output gain range: -∞ to +12 dB

Analog audio (Cue track)

Frequency response: 100Hz to 12kHz ±3 dB
S/N ratio: Better than 44dB (at 3% distortion)
Distortion: Less than 2% (1 kHz reference signal)
Wow & flutter: Less than 0.2% (unweighted)
Operating level: +8, +4, 0, -20dBm (LINE IN/OUT) -60dBm (LINE IN) selectable
Input/output gain range: -∞ to +12 dB

Input/output signal

Video

Input		
Analog:	1.0 ± 0.3Vp-p, 75 ohms	(BNC)
Digital:	RP-125X format	(25P)
Reference:	Composite (Black burst) signal	(BNC)
	Sync & burst 0.3 Vp-p, 75ohms	(BNC)
Output		
Analog:	VIDEO1 (VBS/VB/VS/V switchable)	(BNC)
	VIDEO2 (VBS)	(BNC)
	VIDEO3 (Character ON/OFF)	(BNC)
Digital:	RP-125X format	(25P)

Audio

Input		
Analog (CH1,2,3,4):	Max. +28 dBm 150 ohms/600 ohms/high impedance switchable	(XLR)x4
Digital (CH1/2,3/4):	AES/EBU format	(XLR)x2
Cue Line in:	Max. +18 dBm 150 ohms/600 ohms/high impedance switchable	(XLR)
Output		
Analog (CH1,2,3,4):	Max. +28 dBm low impedance	(XLR)x4
Digital (CH1/2,3/4):	AES/EBU format	(XLR)x2
Cue:	Max. +24 dBm low impedance	
Monitor L/R:	Max, +24 dBm low impedance	(XLR)x2
Headphones:	Variable level control by VR	(M6)

General

Color Frame pulse in/out:	TTL level	(BNC)
Wave Form Monitor out:	75 ohms Video/CTL/RF ENV CH0 or ENV CH1) (selectable)	(BNC)
Time code		
Input:	2.4V ± 1.4Vp-p,10k ohms, balanced	(XLR)
Output:	2.4Vp-p, low impedance, balanced	(XLR)
Remote		
Remote-in:	For 9-pin RS-422A interface	(9pin)
Remote-out:	For 9-pin RS-422A interface	(9pin)
Remote-in/out:	For 9-pin RS-422A interface	(9pin)
RS-232C:	For RS-232C interface	(25pin)
GP-IB:	For GP-IB (IEEE-488) interface	(25pin)
Parallel I/O:	For parallel communication	(50pin)
V/A control:	For video and audio remote control	(15pin)
AUX:	For future use (not used)	(15pin)

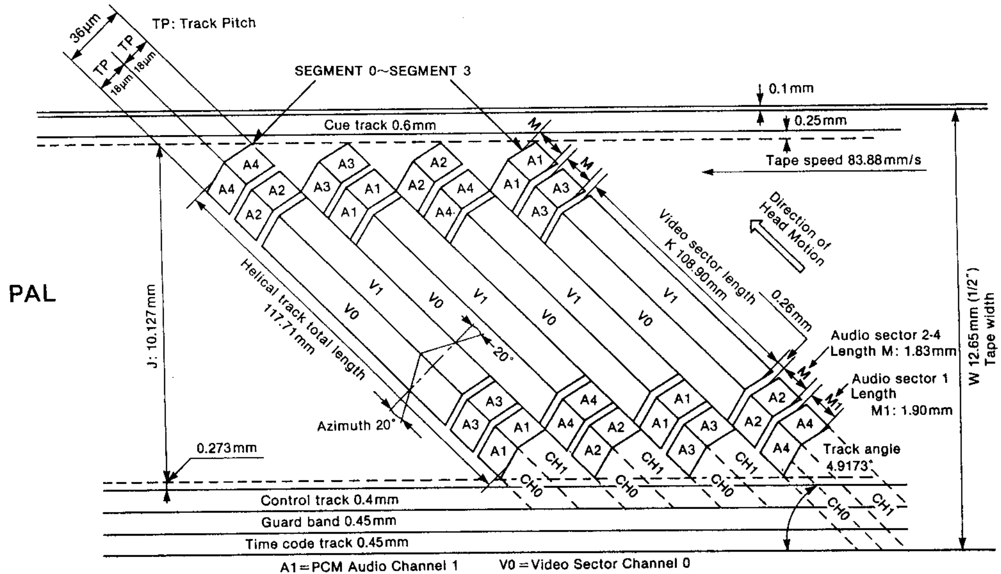
2. Introduction of AJ-D350

New-Format Digital VTR:
Another 1/2" First

The AJ-D350 composite digital 1/2" studio VTR incorporates the outstanding advantages of the digital recording format developed by NHK. Offering a comprehensive, digital solution to dubbing-related picture and sound degradation, this new format is also at home in a number of ENG/EFP applications that are quickly bringing the all-digital VTR production system closer to reality.
The new format records digital video signals onto MII-proven 1/2" cassette tapes with more than double the recording density of the other digital formats and four channels of PCM sound. New 8-14 modulation channel coding and advanced error correction are two more reasons why input/output performance of AJ-D350 is at least comparable to existing digital formats.
The all-digital VTR system is fast approaching, with development proceeding on a complete range of production equipment, from one piece camera recorders to cart machines.
The introduction of the AJ-D350 marks the first milestone.

3. Tape Format

The rotary record heads record 2 digital video and 4 PCM audio sections. Linear tracks for Time Code, Control and a Cue Track signal are recorded by the A.C.E head. The tape wrap angle is 191 degrees and the effective record wrap angle is 178.1 degrees. PAL makes four rotations per frame, producing 8 pairs of tracks. NTSC makes three rotations, producing 6 pairs of tracks. One cycle of the CTL signal is recorded for every two pairs of tracks. The CTL duty cycle is modified to identify the frame and the colour framing sequence. The following table shows the relationship of the CTL duty cycle, field sequence and recorded tracks. Independent Insert Edit recording can be performed on the video and PCM audio tracks. Analog audio signals can be recorded on the Cue track, the Cue track frequency response is 100 Hz to 12kHz ± 3dB.

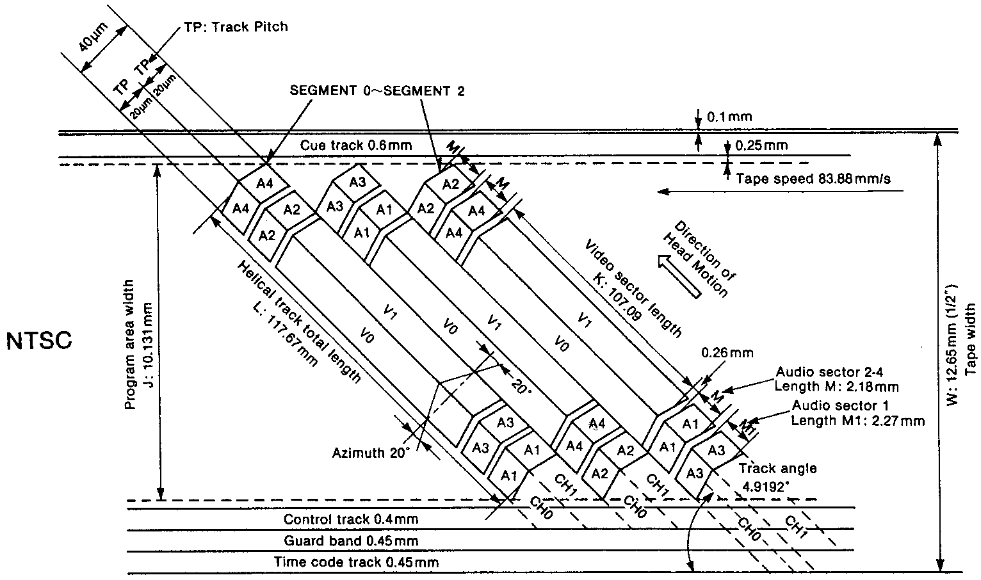

PAL
36µm
TP
TP
18µm
18µm
TP: Track Pitch
SEGMENT 0~SEGMENT 3
0.1mm
Cue track 0.6mm
0.25mm
Tape speed 83.88mm/s
Direction of Head Motion
M
M
A1
A2
A3
A4
V0
V1
Video sector length K 108.90mm
0.26mm
Helical track total length 117.71mm
J: 10.127mm
20°
Azimuth 20°
Audio sector 2-4 Length M: 1.83mm
Audio sector 1 Length M1: 1.90mm
M1
Track angle 4.9173°
0.273mm
CH0
CH1
Control track 0.4mm
Guard band 0.45mm
Time code track 0.45mm
W 12.65mm (1/2") Tape width

A1=PCM Audio Channel 1
A2=PCM Audio Channel 2
A3=PCM Audio Channel 3
A4=PCM Audio Channel 4

V0=Video Sector Channel 0
V1=Video Sector Channel 1

1 Field=4 Tracks (CH0+CH1)=4 segment

AJ-D350 PAL Tape Format (1 Field)


NTSC
40µm
TP
TP
20µm
20µm
TP: Track Pitch
SEGMENT 0~SEGMENT 2
0.1mm
Cue track 0.6mm
0.25mm
Tape speed 83.88mm/s
Direction of Head Motion
M
M
A1
A2
A3
A4
V0
V1
Video sector length K: 107.09
0.26mm
Helical track total length L: 117.67mm
Program area width J: 10.131mm
20°
Azimuth 20°
Audio sector 2-4 Length M: 2.18mm
Audio sector 1 Length M1: 2.27mm
M1
Track angle 4.9192°
CH0
CH1
Control track 0.4mm
Guard band 0.45mm
Time code track 0.45mm
W: 12.65mm (1/2") Tape width

A1=PCM Audio Channel 1
A2=PCM Audio Channel 2
A3=PCM Audio Channel 3
A4=PCM Audio Channel 4

V0=Video Sector Channel 0
V1=Video Sector Channel 1

1 Field=3 Tracks (CH0+CH1)=3 segment

AJ-D350 NTSC Tape Format (1 Field)

Fig. 1 Tape Format

NTSC

Field	Pair Track	CTL Duty
I, II	1, 2	5 : 5
	3, 4	5 : 5
	5, 6	4 : 6
III, IV	1, 2	5 : 5
	3, 4	5 : 5
	5, 6	6 : 4

PAL

Field	Pair Track	CTL Duty
I, II	1, 2	5 : 5
	3, 4	5 : 5
	5, 6	5 : 5
	7, 8	4 : 6
III, IV	1, 2	5 : 5
	3, 4	5 : 5
	5, 6	5 : 5
	7, 8	4 : 6
V, VI	1, 2	5 : 5
	3, 4	5 : 5
	5, 6	5 : 5
	7, 8	4 : 6
VII, VIII	1, 2	5 : 5
	3, 4	5 : 5
	5, 6	5 : 5
	7, 8	6 : 4

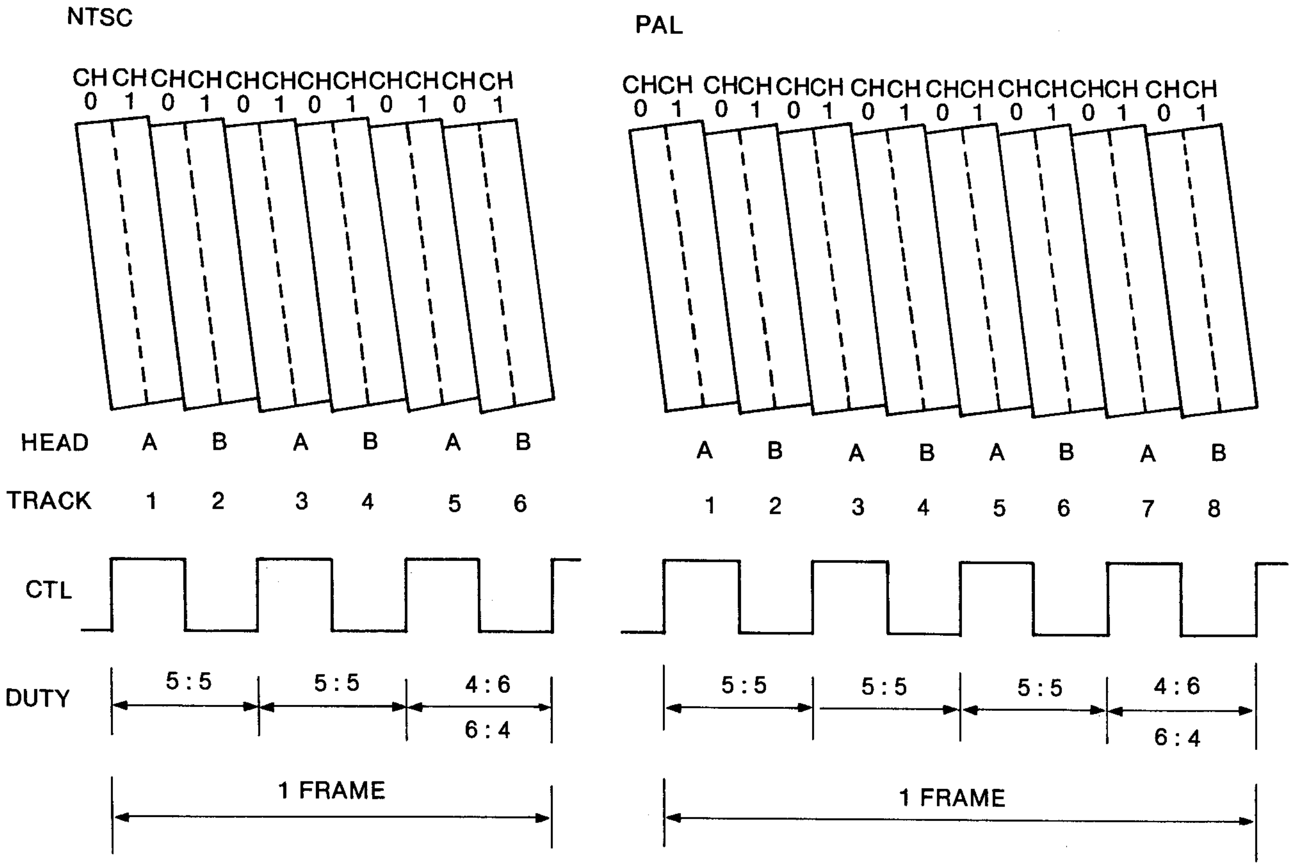

NTSC
CH 0 CH 1 CH 0 CH 1 CH 0 CH 1 CH 0 CH 1 CH 0 CH 1 CH 0 CH 1
HEAD A B A B A B
TRACK 1 2 3 4 5 6
CTL
DUTY 5:5 5:5 4:6 6:4
1 FRAME
PAL
CH 0 CH 1 CH 0 CH 1 CH 0 CH 1 CH 0 CH 1 CH 0 CH 1 CH 0 CH 1 CH 0 CH 1 CH 0 CH 1
A B A B A B A B
1 2 3 4 5 6 7 8
5:5 5:5 5:5 4:6 6:4
1 FRAME

Fig. 2 Control Pulse Duty

4. Head Structure

The diameter of the drum is 76mm. The heads rotate on a scanner in between the fixed upper and lower portions of the drum assembly. The record head, consists of 4 channels. The Auto-Tracking Head provides confidence playback with the phase delayed behind the record head, and pre-read with the phase advanced before the record head. Variable Playback provides noise free pictures between the speeds of 3 times (forward) and one time (reverse). The rotary erase head, consists of 2 channels, during editing these erase previously recorded signals and produce a guard band at the edit points between the old and new recording, preventing crosstalk with neighboring tracks.

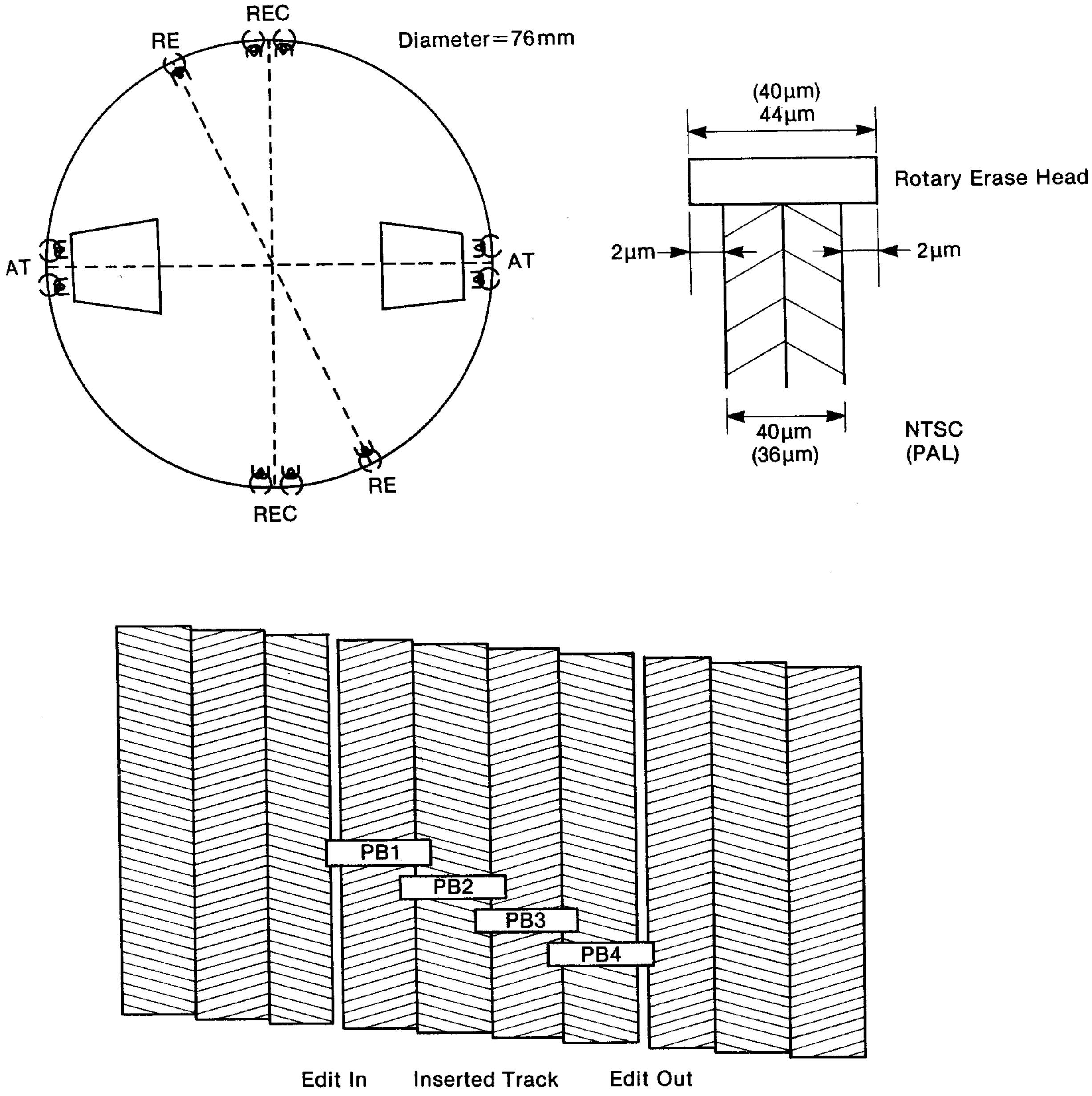

REC
RE
Diameter=76mm
AT
AT
RE
REC
(40μm)
44μm
Rotary Erase Head
2μm
2μm
40μm
(36μm)
NTSC
(PAL)
PB1
PB2
PB3
PB4
Edit In
Inserted Track
Edit Out

Fig. 3 Structure of Head

5. Cassette Tape

There are three sizes of cassette tapes available, S, M and L. The tapes are available two types, 14µm and 11µm thickness. The 11µm thickness will be available in 1991 and permit more tape to be loaded into the cassettes to give longer running times. Each cassette tape is provided with detection bits (tabs), A, B and C. Bit (Tab) A and B are used for prevention of accidental erasure. Bit (Tab) C is not currently used.

Fig. 1 Fig. 2

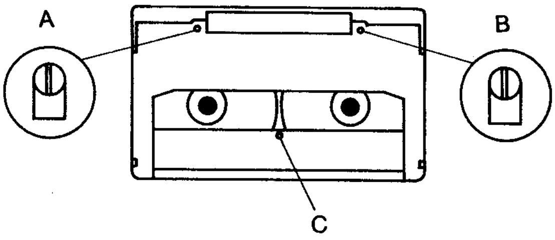
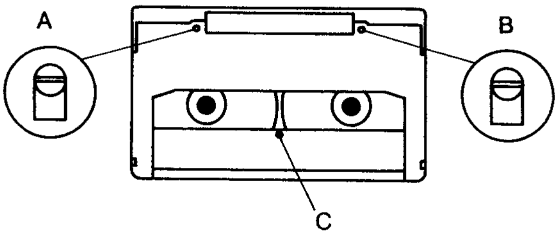


Fig. 3 Fig. 4



Prevention of accidental erasure

Detection bit	Recording of all signals is possible	Recording of all signals is prohibited
A (Note) Bit A takes priority over bit B.	Use an ordinary screwdriver to push down on the pin, turn it 90° to the right and set it to the "lowered" position. Fig. 1	Use the screwdriver to turn the pin 90° to the left and set it to the "raised" position. Fig. 3

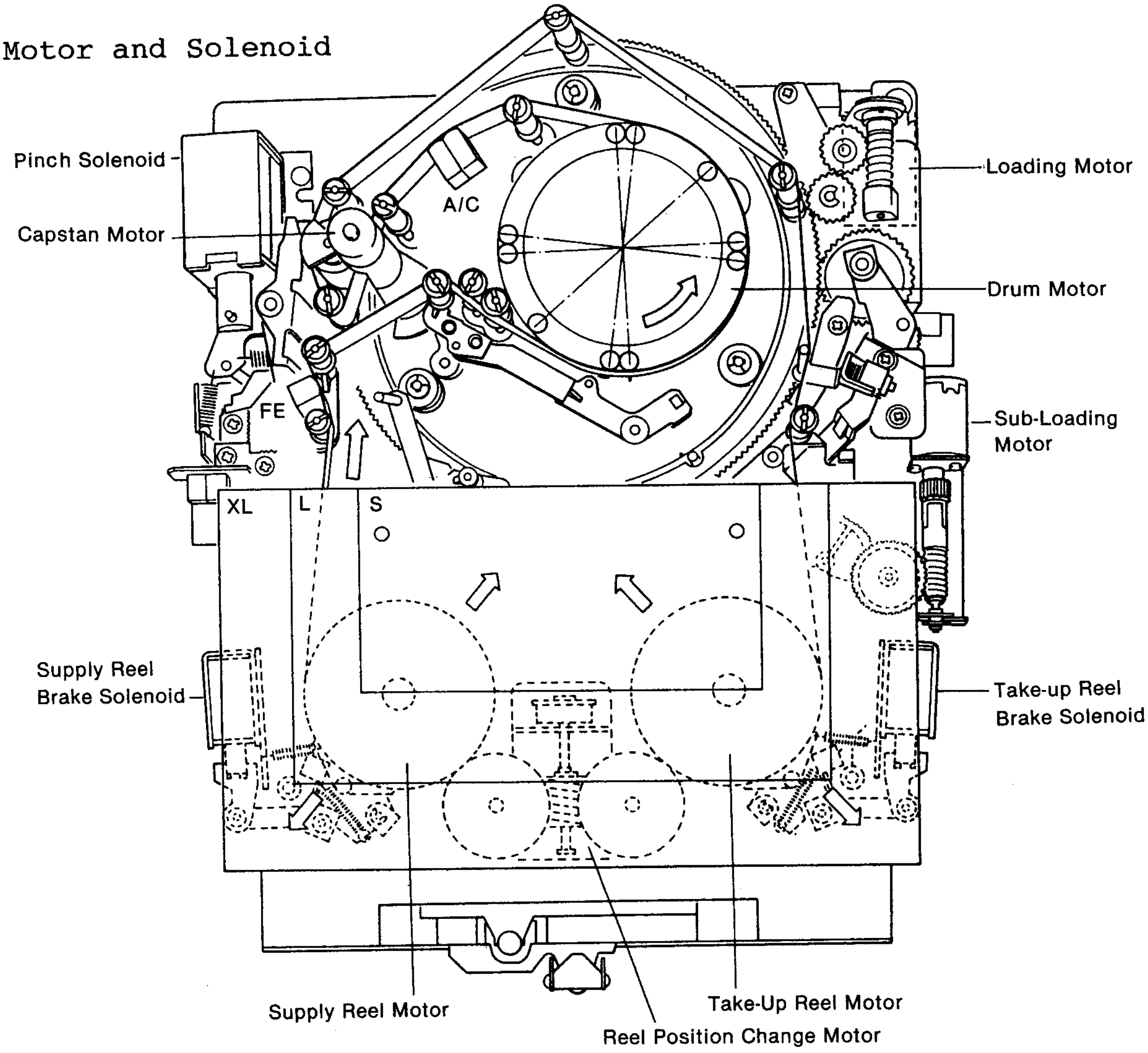
Detection bit	Recording of all signals is possible	Recording of video, control signal is prohibited
B (Note) Valid only when bit A is in Fig. 1 position.	Use an ordinary screwdriver to push down on the pin, turn it 90° to the right and set it to the "lowered" position. Fig. 2	Use the screwdriver to turn the pin 90° to the left and set it to the "raised" position. Fig. 4

	NEW 1/2″ D-VTR					
	S CASSETTE		M CASSETTE		L CASSETTE	
CASSETTE SIZE (mm)	161 × 98 × 25		121 × 124 × 25		296 × 167 × 25	
RECORDING TIME(min)	50	64	95	125	185	245
DRUM DIAMETER (mm)	76					
NO OF ROTATION (rpm)	5400/NTSC 6000/PAL					
TAPE SPEED (mm/s)	83.88					
TRACK PITCH (µ)	20.0/NTSC 18.0/PAL					
TAPE THICKNESS (µ)	14.0	11.0	14.0	11.0	14.0	11.0
TAPE WIDTH (mm)	12.65					
TAPE LENGTH (m)	254	330	481	632	936	1240

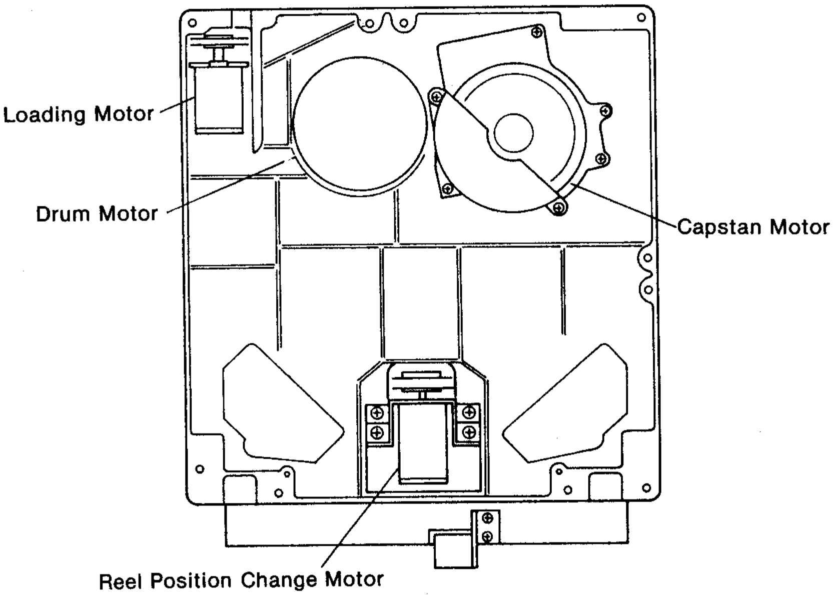
Fig. 4 Cassette Tape

6. Mechanism

1). Motor and Solenoid


Pinch Solenoid
Capstan Motor
A/C
FE
Loading Motor
Drum Motor
Sub-Loading Motor
XL
L
S
Supply Reel Brake Solenoid
Take-up Reel Brake Solenoid
Supply Reel Motor
Take-Up Reel Motor
Reel Position Change Motor

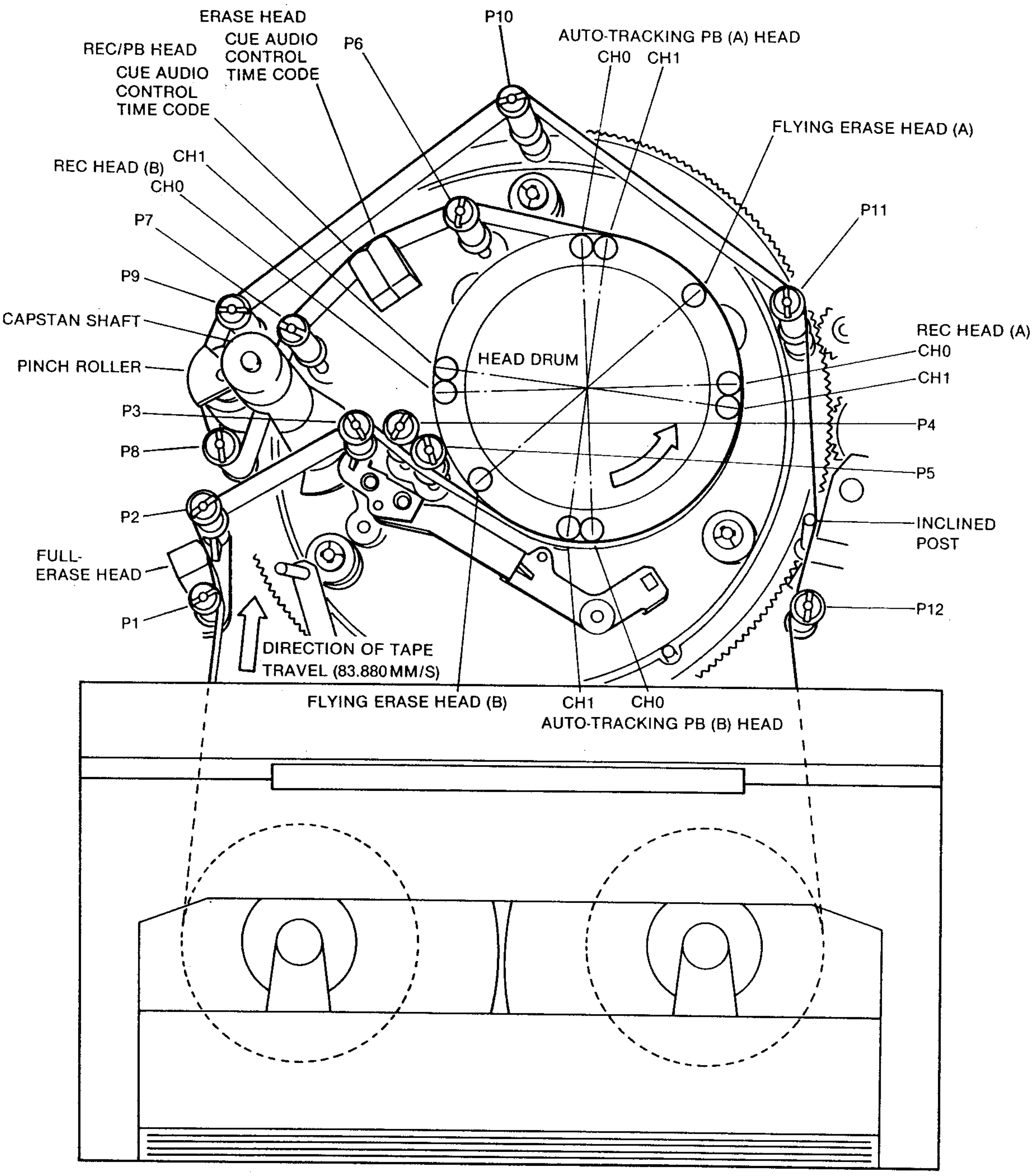
<Top View>


Loading Motor
Drum Motor
Capstan Motor
Reel Position Change Motor

<Rear View>

Fig. 5 Mechanism

2). Tape Transport system and Head Assignment


ERASE HEAD
REC/PB HEAD
CUE AUDIO
CONTROL
TIME CODE
CUE AUDIO
CONTROL
TIME CODE
P6
P10
AUTO-TRACKING PB (A) HEAD
CH0 CH1
FLYING ERASE HEAD (A)
REC HEAD (B)
CH1
CH0
P7
P11
P9
CAPSTAN SHAFT
PINCH ROLLER
HEAD DRUM
REC HEAD (A)
CH0
CH1
P3
P4
P8
P5
P2
INCLINED POST
FULL-ERASE HEAD
P12
P1
DIRECTION OF TAPE TRAVEL (83.880 MM/S)
FLYING ERASE HEAD (B)
CH1 CH0
AUTO-TRACKING PB (B) HEAD

STUDIO VTR TAPE PATH LIMIT

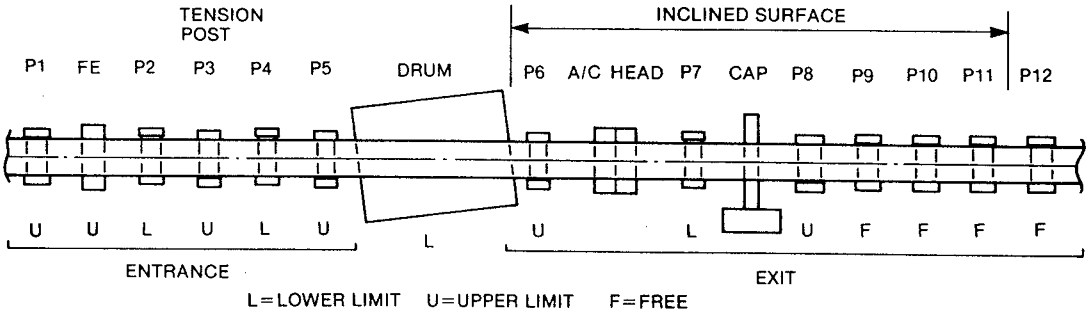

TENSION POST
INCLINED SURFACE
P1
FE
P2
P3
P4
P5
DRUM
P6
A/C HEAD
P7
CAP
P8
P9
P10
P11
P12
U
U
L
U
L
U
L
U
L
U
F
F
F
F
ENTRANCE
EXIT
L=LOWER LIMIT U=UPPER LIMIT F=FREE

Fig. 6 Tape Transport

DRUM MOTOR

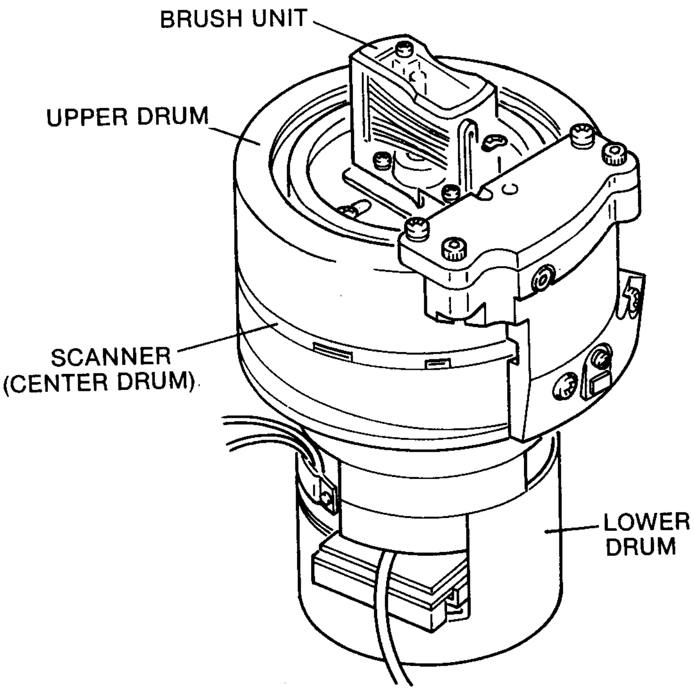
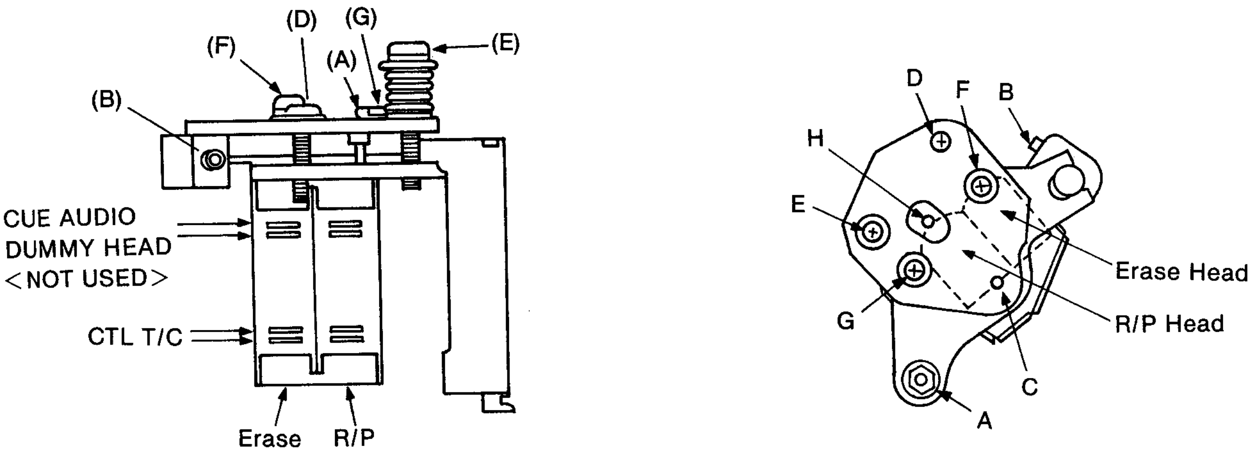

BRUSH UNIT
UPPER DRUM
SCANNER
(CENTER DRUM)
LOWER
DRUM

Fig. 7 **Drum Motor**


(D)
(G)
(F)
(A)
(E)
(B)
CUE AUDIO
DUMMY HEAD
<NOT USED>
CTL T/C
Erase
R/P
D
F
B
H
E
Erase Head
R/P Head
G
C
A

A/C Head

Purpose of each screws
A: Tilt Adjustment
B: Fix for A/C Head Height
C: Height Adjustment
D: Coarse Azimuth Adjustment
E: Spring Tension and Fine Azimuth Adjustment
F, G: Fix for A/C Head Horizontal Position
H: Horizontal Position Adjustment Hole

Fig. 8 **A/C Head**

3). Sensors

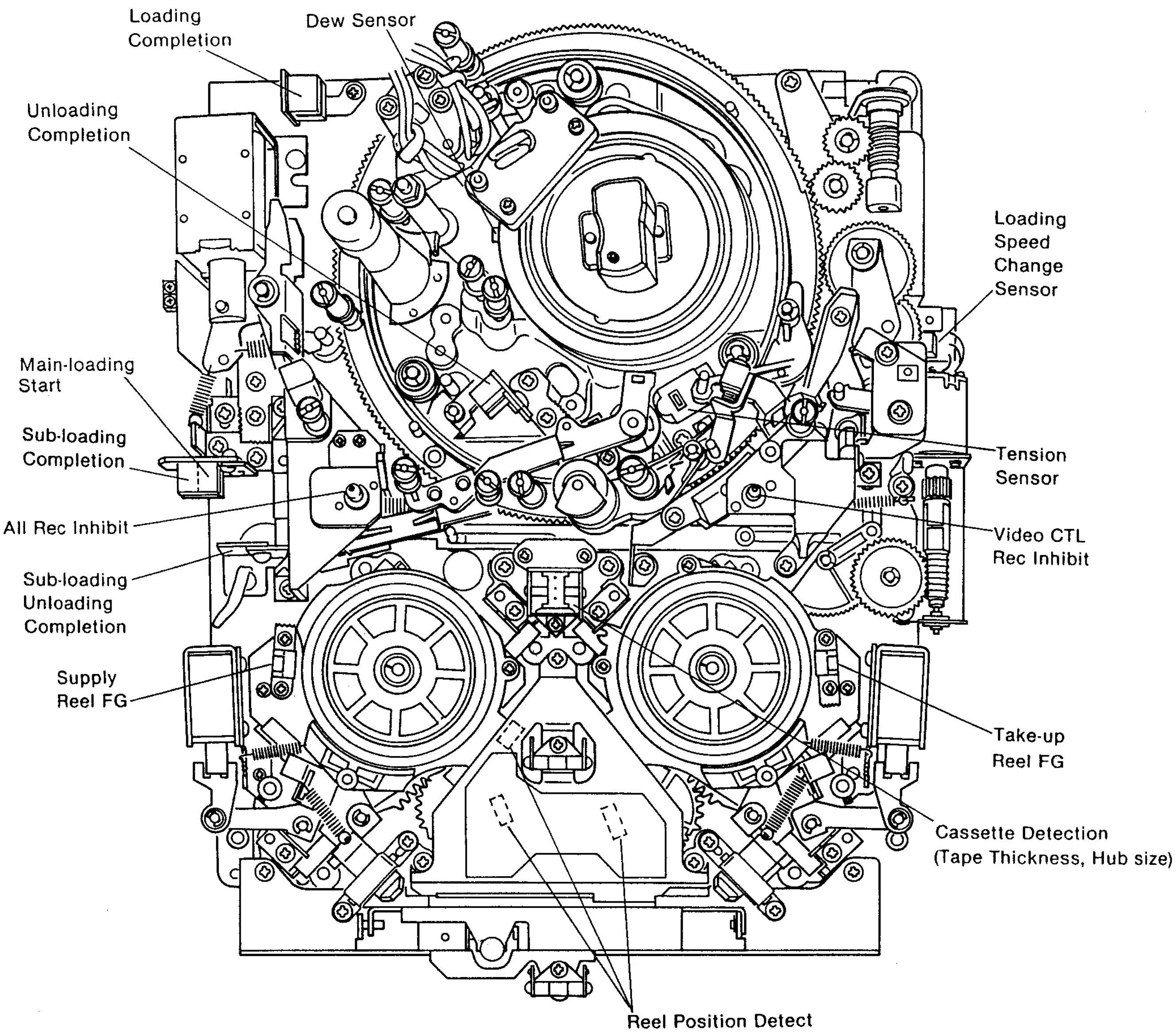
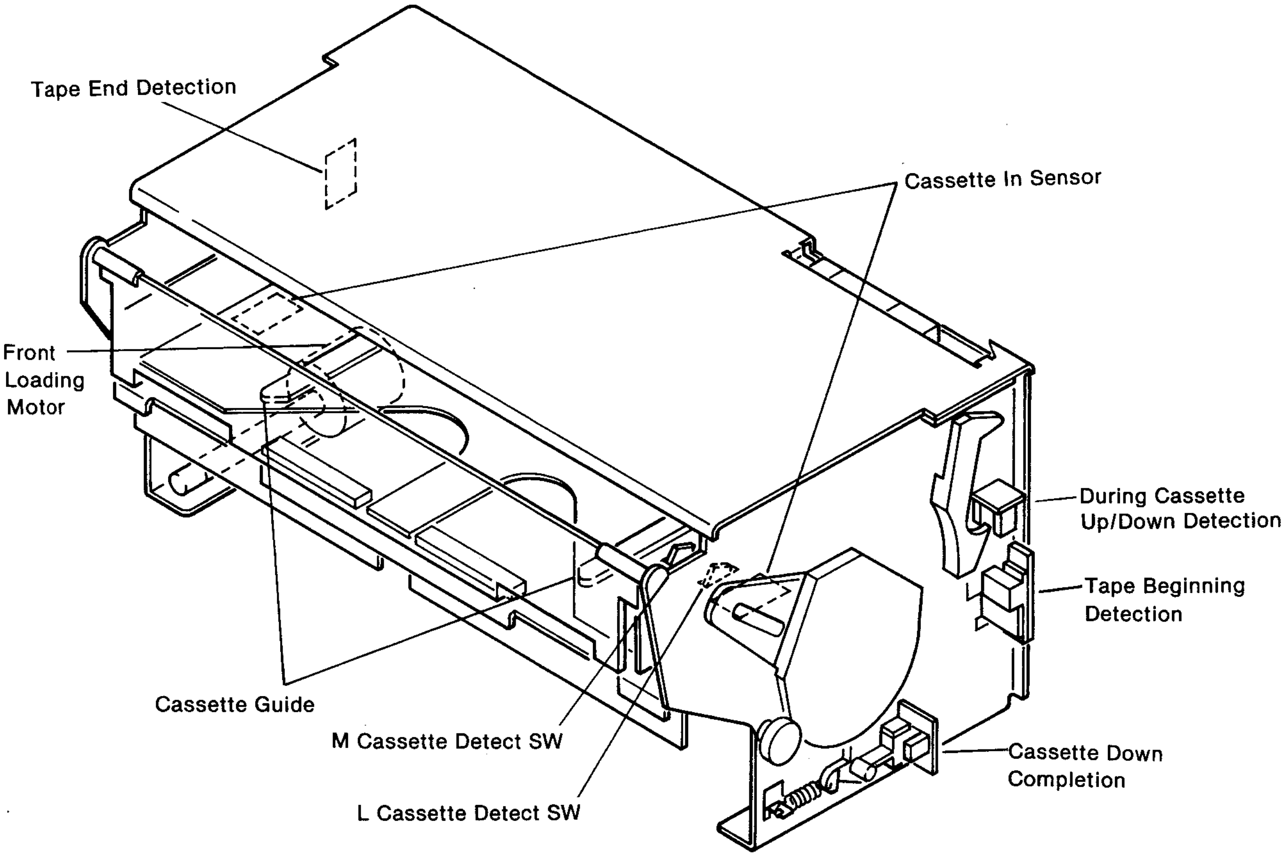

Loading Completion
Dew Sensor
Unloading Completion
Loading Speed Change Sensor
Main-loading Start
Sub-loading Completion
All Rec Inhibit
Sub-loading Unloading Completion
Supply Reel FG
Tension Sensor
Video CTL Rec Inhibit
Take-up Reel FG
Cassette Detection (Tape Thickness, Hub size)
Reel Position Detect

Fig. 9 Sensors of Mechanism

4). Cassette Compartment

The cassette compartment will accommodate Small, Mediam and Large cassettes without an adapter. M and L cassettes are detected by switches in the cassette compartment. If neither of these switches is operated, the presence of a Small cassette is assumed.

The cassettes are positioned by the use of cassette guides -
The S cassette is inserted between the guides, the M and L cassettes depress sensors which determine the tape size.
The front loading motor can be rotated manually to release the tape in the event of a power loss.


Tape End Detection
Cassette In Sensor
Front Loading Motor
During Cassette Up/Down Detection
Tape Beginning Detection
Cassette Guide
M Cassette Detect SW
L Cassette Detect SW
Cassette Down Completion

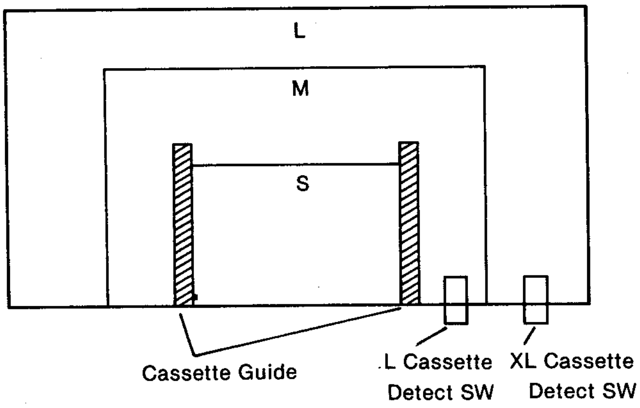

L
M
S
Cassette Guide
L Cassette Detect SW
XL Cassette Detect SW

Fig. 10 Cassette Compartment

5). General Descriptions of Mechanism

(1) Reel Base

The AJ-D350 mechanism is based on the MII mechanism with additional improvements made in the areas of durability and service access.

The 3 cassette sizes (S, M and L) can be used without adapters. To achieve this the Reel Base moves according to the cassette size.
The reel motors are flat and specially designed for the AJ-D350s 100x search mode.

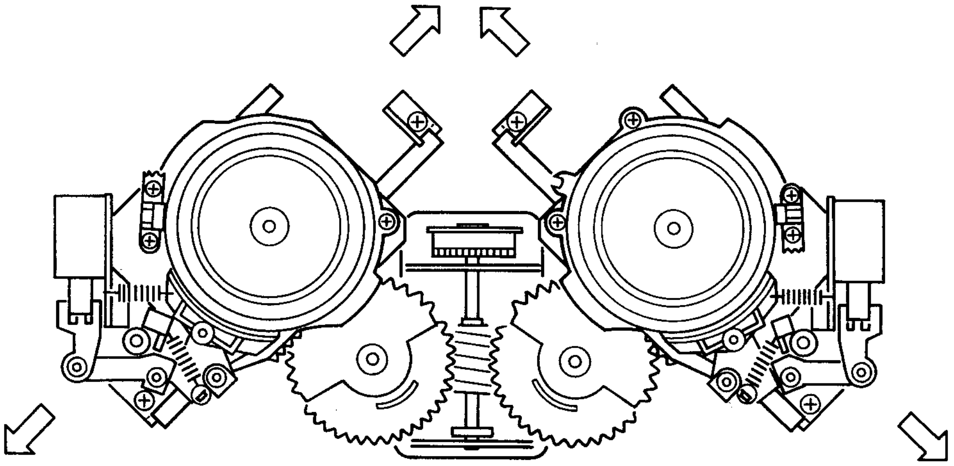


Fig. 11 Reel Base

(2) Tape Transport

The tape transport is designed to achieve a low tape tension of 30g at the drum entrance. This low tension increases head and tape life, and reduces head clogging.
It also increases the useful battery life in portable applications as the reel drive torque is reduced.

Rotary posts with ball bearing are used for tape transport posts, only one post is fixed. That post is inclined post and its tape wrap angle is 37 degrees.
The tape wrap angle around the drum is 191 degrees, the effective record wrap angle is 178.1 degrees. The tape room angle outside the effective area is about 7 degrees and 6 degrees.
The AC head is used for cue audio, control pulse and time code, and in R/P and erase modes.
Tape loading process is as follows, the beginning is slow, the middle is fast and the end is slow. The speed is selected by loading position switches. This makes tape loading speed fast without tape damage.
In the case of ready off mode, the tension release or sub-loading position can be selected; from front panel.
When the sub-loading position is selected, tape and heads are not in contact. This is good for tape and head life. This position is useful either when the VTR is used in "Stand alone" applications, or in a cart system.

7. Audio Video Overall Block Diagram

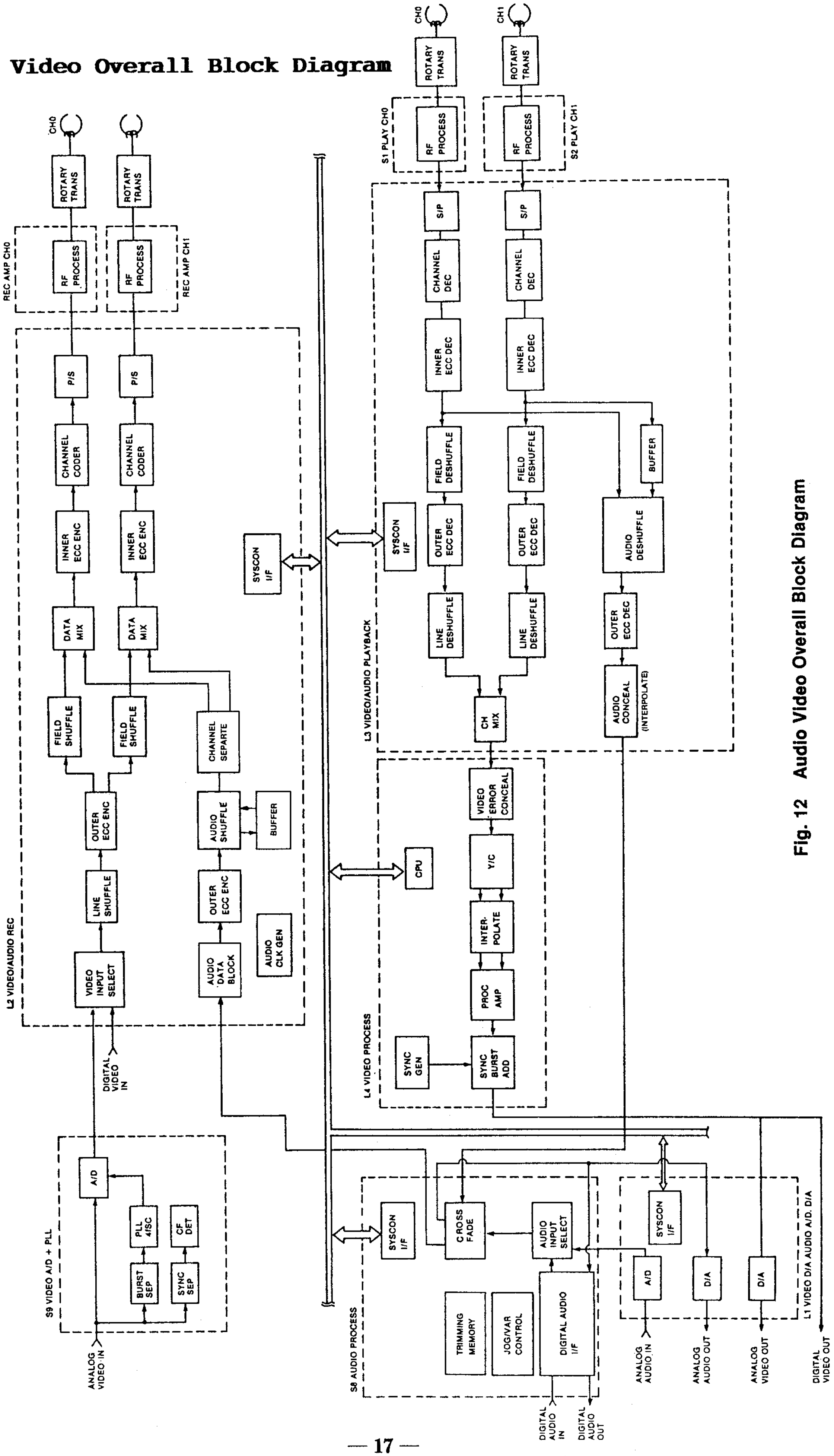

CH0
ROTARY TRANS
REC AMP CH0
RF PROCESS
CH1
ROTARY TRANS
RF PROCESS
REC AMP CH1
L2 VIDEO/AUDIO REC
P/S
CHANNEL CODER
INNER ECC ENC
DATA MIX
FIELD SHUFFLE
OUTER ECC ENC
LINE SHUFFLE
VIDEO INPUT SELECT
CHANNEL SEPARTE
AUDIO SHUFFLE
BUFFER
OUTER ECC ENC
AUDIO DATA BLOCK
AUDIO CLK GEN
SYSCON I/F
DIGITAL VIDEO IN
S9 VIDEO A/D + PLL
A/D
PLL 4fSC
CF DET
BURST SEP
SYNC SEP
ANALOG VIDEO IN
S1 PLAY CH0
S2 PLAY CH1
S/P
CHANNEL DEC
INNER ECC DEC
FIELD DESHUFFLE
OUTER ECC DEC
LINE DESHUFFLE
CH MIX
BUFFER
AUDIO DESHUFFLE
AUDIO CONCEAL (INTERPOLATE)
L3 VIDEO/AUDIO PLAYBACK
SYSCON I/F
CPU
L4 VIDEO PROCESS
VIDEO ERROR CONCEAL
Y/C
INTER. POLATE
PROC AMP
SYNC BURST ADD
SYNC GEN
S8 AUDIO PROCESS
SYSCON I/F
CROSS FADE
AUDIO INPUT SELECT
TRIMMING MEMORY
JOG/VAR CONTROL
DIGITAL AUDIO I/F
DIGITAL AUDIO IN
DIGITAL AUDIO OUT
L1 VIDEO D/A AUDIO A/D, D/A
SYSCON I/F
A/D
D/A
D/A
ANALOG AUDIO IN
ANALOG AUDIO OUT
ANALOG VIDEO OUT
DIGITAL VIDEO OUT

Fig. 12 Audio Video Overall Block Diagram

Overall Block Signal Flow

1. S9 Video A/D and PLL
8bit 4fsc analog to digital converter.

2. L1 Video D/A and Audio A/D, D/A
Video D/A conversion and Audio A/D, D/A conversion are performed by this circuit.

3. L2 Video Audio REC
(1) Digital In/ Analog In selection
(2) Video Recording digital process
(3) Audio Recording digital process
(4) Video Audio Mix
(5) Parallel to Serial conversion

4. S1 RF Play CH0
S2 RF Play CH1
RF playback is performed in these boards.

5. Rotary Transformer and Heads
RF processed video and audio signals are recorded and played back by rotary heads on the drum, through the rotary transformer.

6. L3 Video Audio Playback
(1) Error correction and detection
(2) Video and Audio Separation
(3) Digital Audio in and out

7. L4 Video Process
(1) Video Error Concealment
If the error is not corrected by the Video and Audio Playback circuit, error concealment is performed by this circuit.

(2) Video Process
Video, Y and C level and phase are adjusted by this circuit.

(3) Sync Generator

(4) Sync Burst Mix

8. Audio Process
(1) Audio Analog and Digital input select
(2) Audio Cross Fade

AJ-D350 P.C. Board List

Ref	Name	VR	Total Parts
L1	VIDEO D/A, AUDIO A/D D/A	15	1626
L2	VIDEO/ AUDIO REC	3	883
L3	VIDEO/ AUDIO PB	0	740
L4	VIDEO PROCESS	21	1452
S1	EQUALIZER CH0	32	942
S2	EQUALIZER CH1	32	942
S3	CUE AUDIO	14	652
S4	AT	12	466
S5	SERVO	11	683
S6	TIME CODE	23	397
S7	SYSTEM CONTROL	1	397
S8	AUDIO PROCESS	26	357
S9	VIDEO A/D & INPUT PLL	25	712
M1	DRIVE	0	468
RF	REC AMP	10	578
	HEAD AMP	0	141
	H. A POWER (R)	0	26
	H. A REGULATOR (S)	2	68
Mother	L. MOTHER	0	85
	S. MOTHER	0	47
Power	POWER SUPPLY 1 POWER SUB 1	3	213
	POWER SUPPLY 2 POWER SUB 2	3	293
	POWER SUB 3	0	32
Front Panel	EJECT	0	3
	POWER LED	0	5
	AUTO OFF	0	8
Front Panel	FR MODE	0	36
	FR SW	0	136
	FR FUNCTION	0	60
	FR BASE 1	1	138
	FR BASE 2	2	134
	H. P JACK 1	1	6
Rear Panel	REMOTE JACK 1	0	73
	VIDEO IN/OUT	0	51
	REMOTE JACK 2	0	74
	REMOTE JACK 3	0	4
	AUDIO IN/OUT	0	111
	DIGITAL AUDIO IN	0	3
	DIGITAL AUDIO OUT	0	3
Other	AUDIO IN/OUT	0	582
	MECHA I/F	0	63
	FR H.P AMP	0	43
	BUFFER AMP	0	178
	AT POWER	3	132
		185	14,161

Fig. 13 P.C. Board List

8. ERROR CORRECTION AND ERROR CONCEALMENT

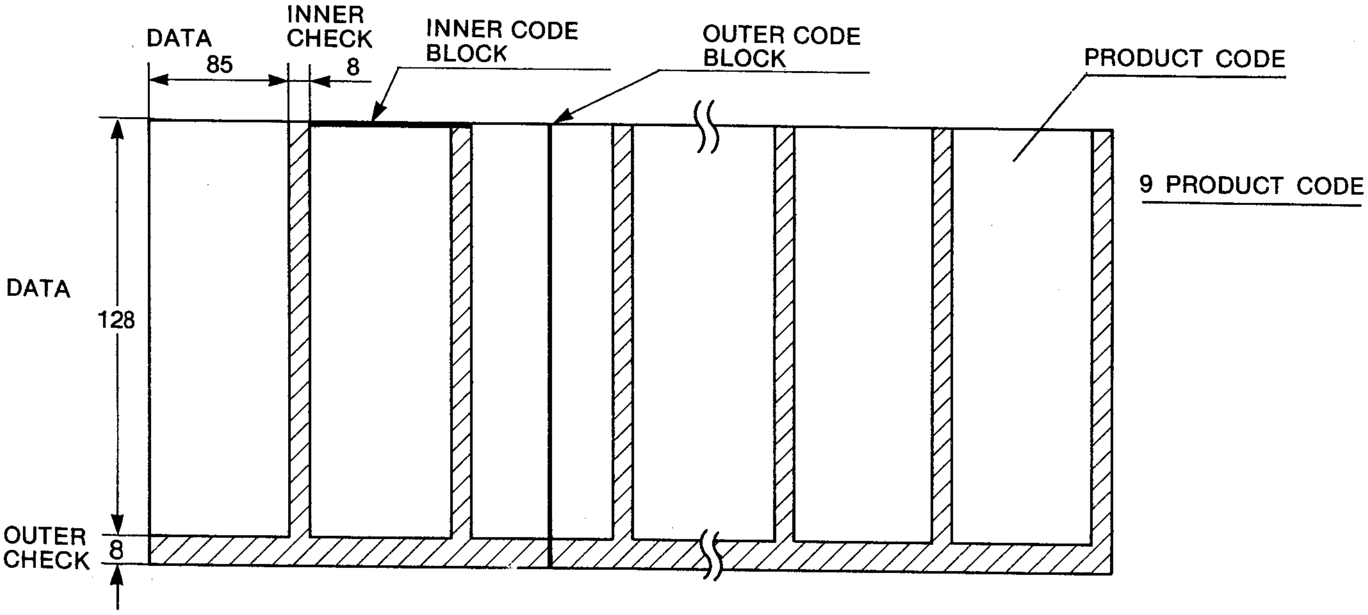
Errors in the playback data caused by drop-out or mis-tracking are corrected by the Error Correction circuit. Any errors that the Error Correction circuit cannot correct are concealed by the Concealment circuit, using the surrounding data.

Error Correction

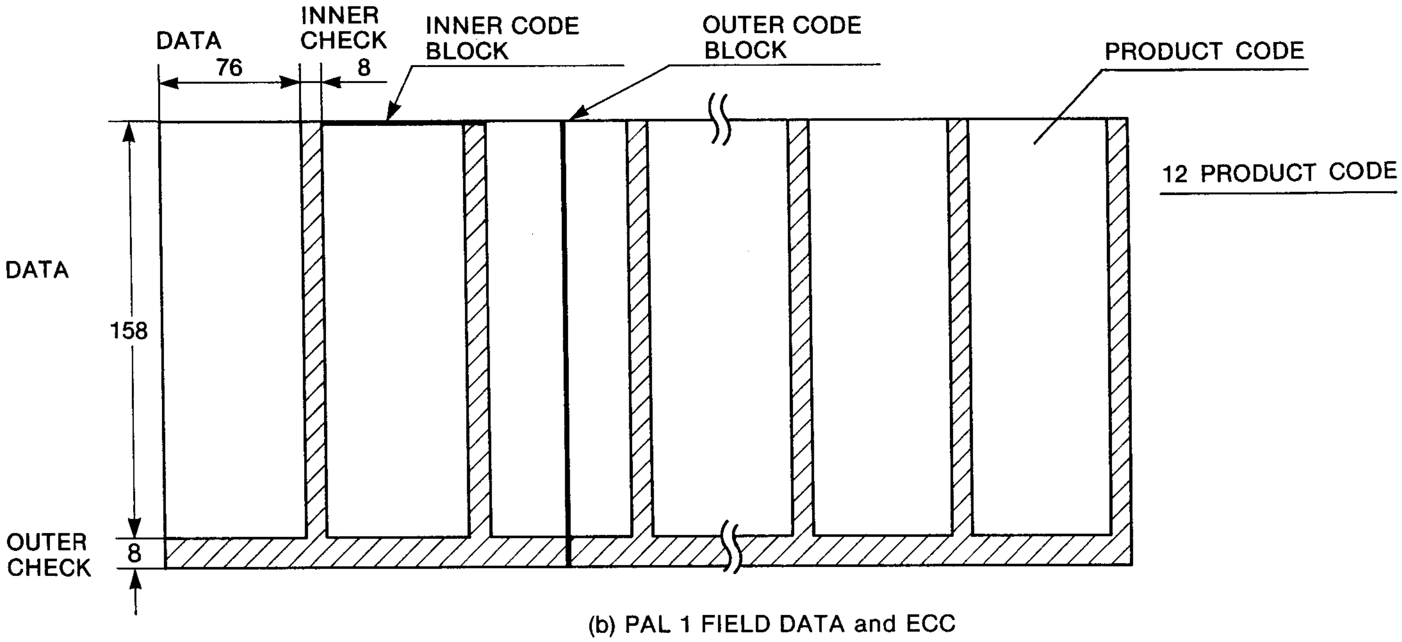
Playback Data errors consist of random errors which may be caused by noise in the playback signal, and burst errors which are caused by drop-out due to tape damage. In this system, effective error correction is achieved using Double Reed Solomon coding which utilises an inner code and an outer code. This provides correction in two different axes. The inner code and outer code each consist of 8 check bytes. The inner code can correct up to four errors in one block, the outer code can correct up to eight errors in one segment column. In relation to the video signal, errors in up to 15 lines can be corrected, (20 blocks). The inner code is calculated in a lateral direction, providing a code of 8 words, the outer code makes a calculation in a vertical direction also providing a code of 8 words.

Shuffling

This format system performs shuffling of data bytes over 1 field. Shuffling is the diversification of data, and will minimize the number of errors that occur in one block improving the possibility of Error Correction. To perform Shuffling, input data is temporarily stored in memory (RAM). The stored data is then read from the memory in a different order to that which it was written. Even if the Error Correction circuit fails to correct all of the errors, shuffling will enable the Concealment circuit to conceal the errors using the surrounding data.



(a) NTSC 1 FIELD DATA and ECC

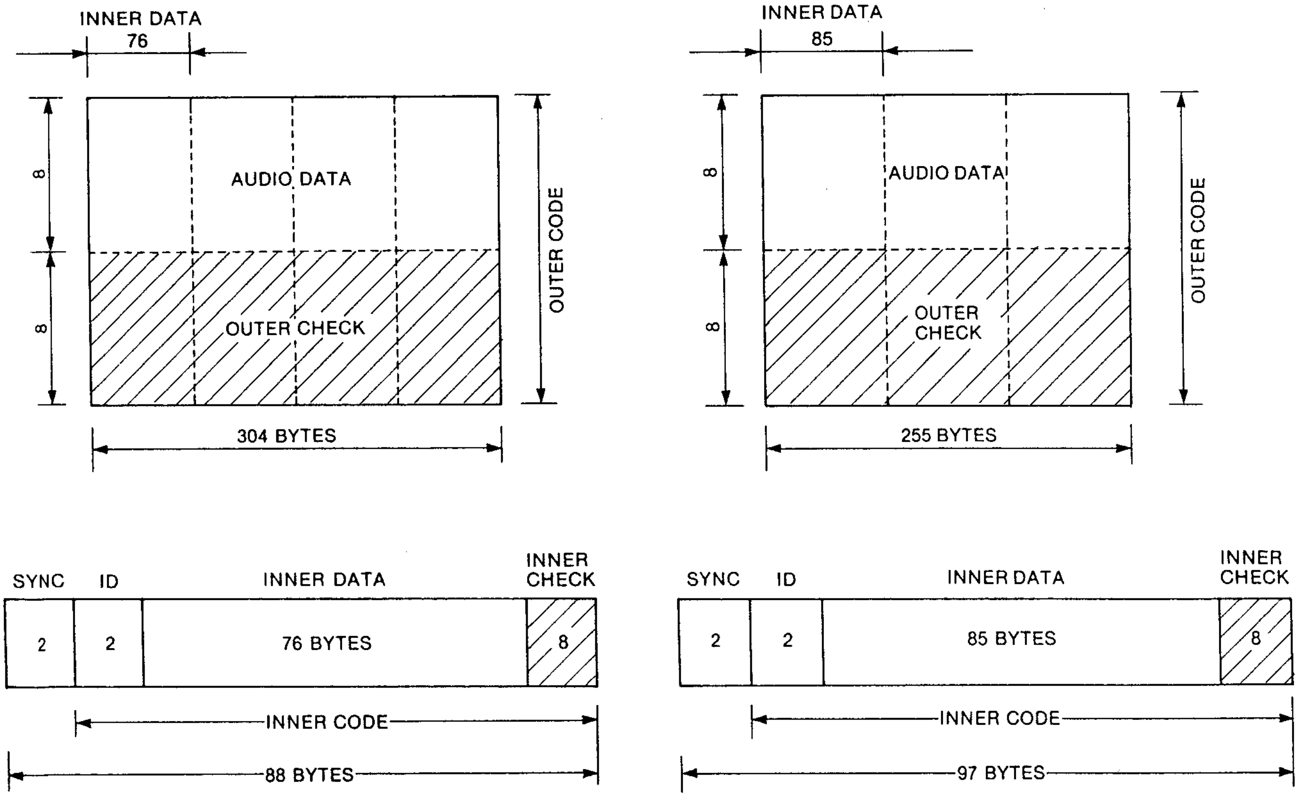

DATA
76
INNER
CHECK
8
INNER CODE
BLOCK
OUTER CODE
BLOCK
PRODUCT CODE
12 PRODUCT CODE
DATA
158
OUTER
CHECK
8

(b) PAL 1 FIELD DATA and ECC

Fig. 14 1 Field Memory

9. PCM Audio Error Correction

PCM audio also uses the same error correction codes as those previously described, the inner code and the outer code each consist of 8 words. The outer code can correct up to 8 errors and the inner code up to 4 errors at the same time.


INNER DATA
76
8
8
AUDIO DATA
OUTER CHECK
OUTER CODE
304 BYTES
INNER DATA
85
8
8
AUDIO DATA
OUTER
CHECK
OUTER CODE
255 BYTES
SYNC
ID
INNER DATA
INNER
CHECK
2
2
76 BYTES
8
INNER CODE
88 BYTES
SYNC
ID
INNER DATA
INNER
CHECK
2
2
85 BYTES
8
INNER CODE
97 BYTES

Block structure

PAL

Block structure

NTSC

Fig. 15 PCM Auido Block Structure

10. Video Circuit

(1) A/D Converter

Sampling is performed at intervals of 4Fsc, quantization is 8 bit. 10 bits are assigned to the digital interface, because the AJ-D350 processing is 8 bits, the two low order bits are not used.

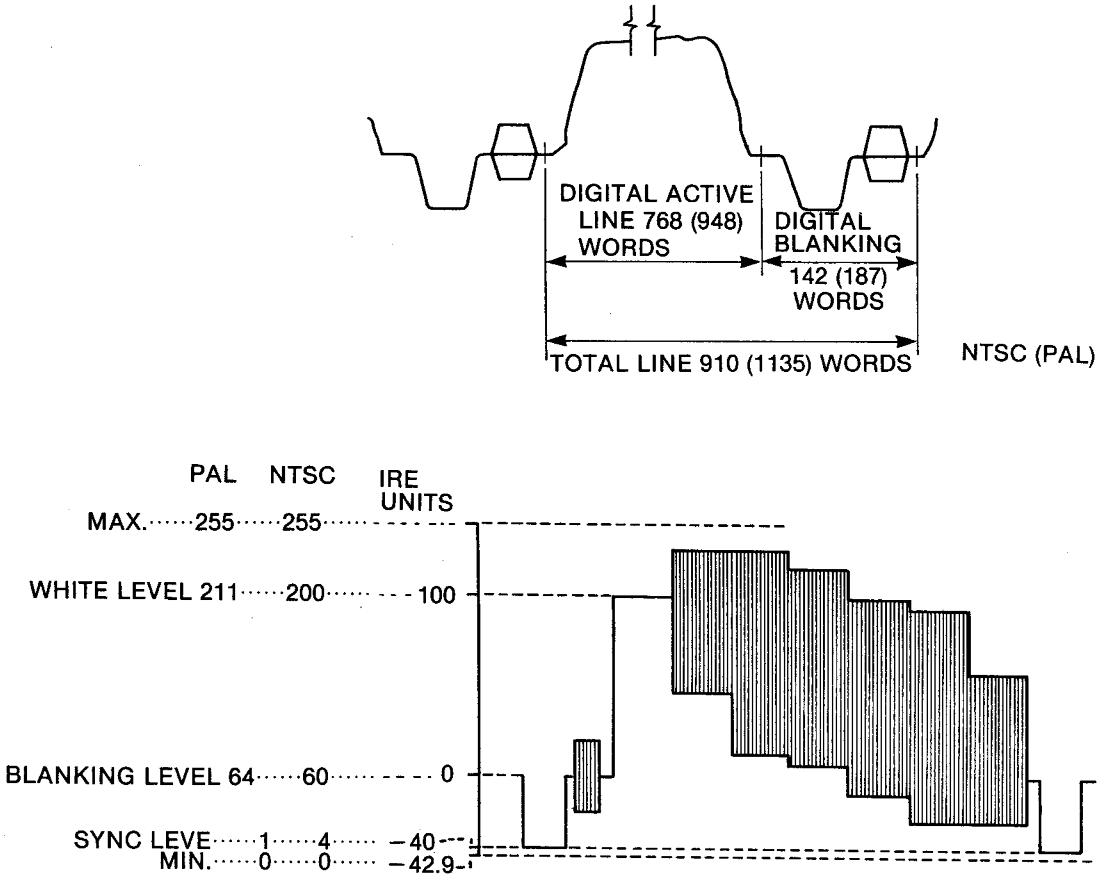

DIGITAL ACTIVE LINE 768 (948) WORDS
DIGITAL BLANKING
142 (187) WORDS
TOTAL LINE 910 (1135) WORDS
NTSC (PAL)
PAL
NTSC
IRE UNITS
MAX.······255······255······
WHITE LEVEL 211······200······ 100
BLANKING LEVEL 64······60······ 0
SYNC LEVE······1······4······ −40
MIN.······0······0······ −42.9

Fig. 16 Video A/D Converter Level

BLOCK DIAGRAM OF REC CIRCUIT

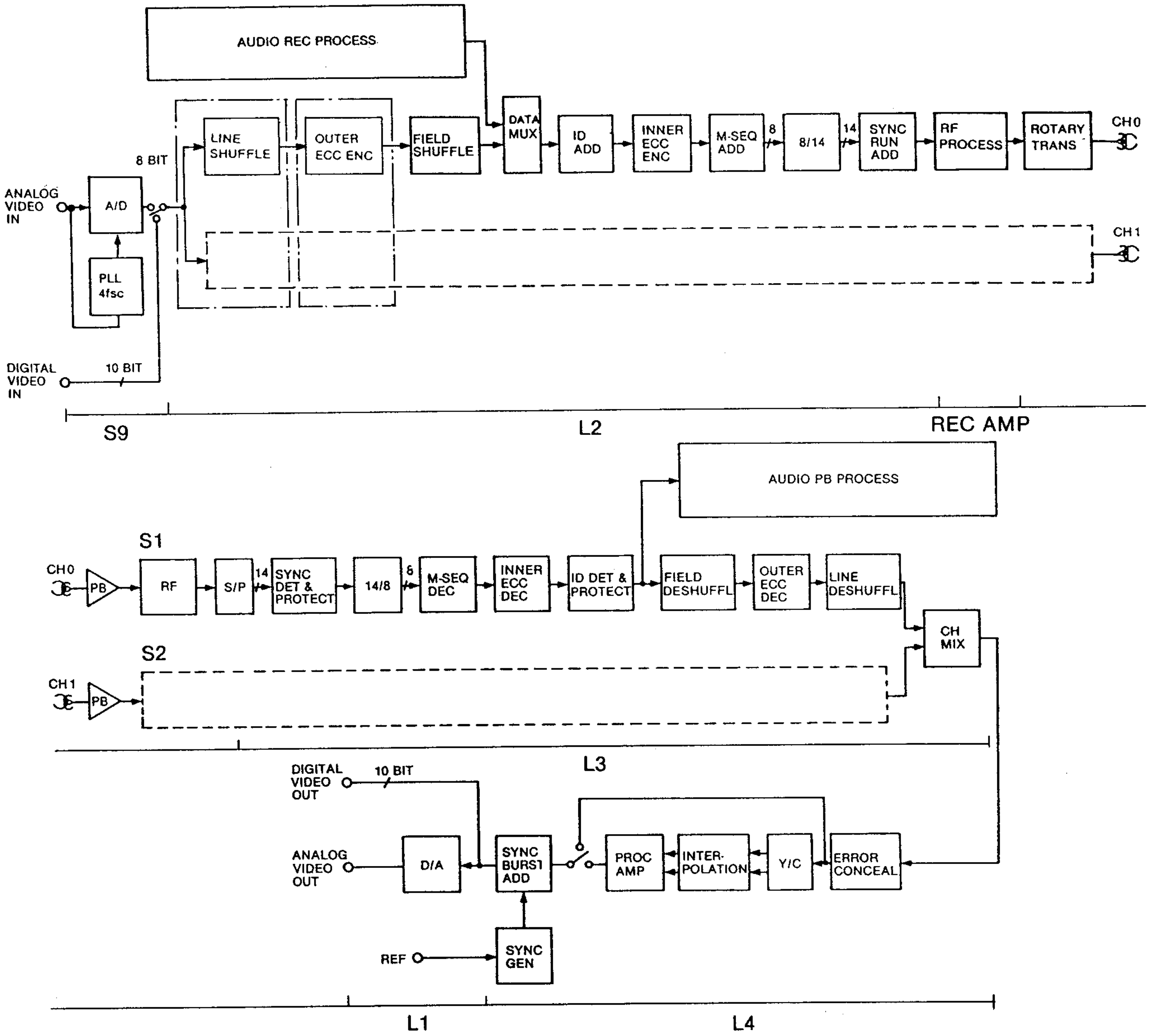

AUDIO REC PROCESS
ANALOG VIDEO IN
A/D
PLL 4fsc
8 BIT
DIGITAL VIDEO IN
10 BIT
LINE SHUFFLE
OUTER ECC ENC
FIELD SHUFFLE
DATA MUX
ID ADD
INNER ECC ENC
M-SEQ ADD
8
8/14
14
SYNC RUN ADD
RF PROCESS
ROTARY TRANS
CH0
CH1
S9
L2
REC AMP
AUDIO PB PROCESS
S1
CH0
PB
RF
S/P
14
SYNC DET & PROTECT
14/8
8
M-SEQ DEC
INNER ECC DEC
ID DET & PROTECT
FIELD DESHUFFL
OUTER ECC DEC
LINE DESHUFFL
CH MIX
S2
CH1
PB
L3
DIGITAL VIDEO OUT
10 BIT
ANALOG VIDEO OUT
D/A
SYNC BURST ADD
PROC AMP
INTER-POLATION
Y/C
ERROR CONCEAL
REF
SYNC GEN
L1
L4

Fig. 17 Video Recording & Playback Block Diagram

(2) Line Shuffle

Line shuffle re-arranges the position of bytes of data in one horizontal line. This operation is reversed in playback and reduce the effect of burst errors by spreading them over the line.

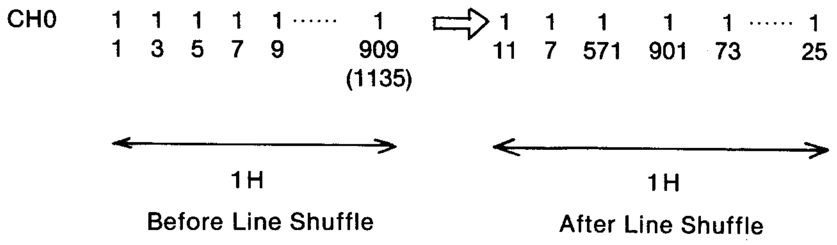

CH0
1 1 1 1 1 1
1 3 5 7 9 909
(1135)
1 1 1 1 1 1
11 7 571 901 73 25
1H
Before Line Shuffle
1H
After Line Shuffle

Fig. 18 Line Shuffle

(3) Outer ECC Encoder (ECC = Error Correction Code)

This encoder produces an error check code of 8 bytes from each row of the 85 (76) rows of 128 (158) bytes of the line-shuffled data. This code is called Outer ECC.

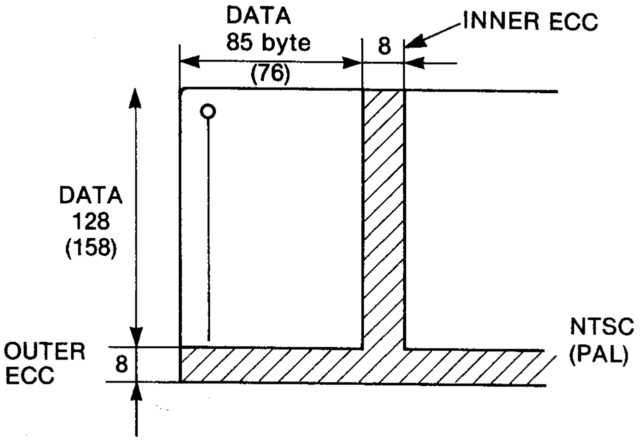

DATA
85 byte
(76)
8
INNER ECC
DATA
128
(158)
OUTER
ECC
8
NTSC
(PAL)

Fig. 19 Outer ECC

(4) Field Shuffle
Field shuffle re-arranges the position of bytes of data in one Field. This operation is reversed during playback and reduces the effect of burst errors by spreading them over the field, thus improving error correction.

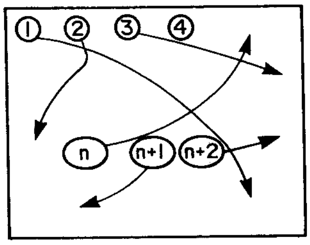


Fig. 20 Field Shuffle

(5) MUX (Multiplex Circuit)
The Multiplex circuit is used to multiplex the video and audio signals before they are recorded onto tape.

(6) ID ADD Circuit, (add identification to the Data Block).
The ID ADD circuit adds a two byte ID code to the data block. Four areas are identified, these are,

- *Block Number
- *The type of data in the block either Video or Audio
- *The Segment Number
- *The Field Number

The ID code consists of ID0 and ID1. The Block number consists of 9 bits (8 bits: B0 to B7 of ID0 and 1 bit : B8 of ID1).
The Video / Audio ID is indicated by Bit 7, the MSB of ID1, if video Bit 7 = 0, 1 = audio. The remaining bits are used to identify the Segment number and Field number. The blocks are numbered sequentially so that any error which occurs can be detected and compensated for.

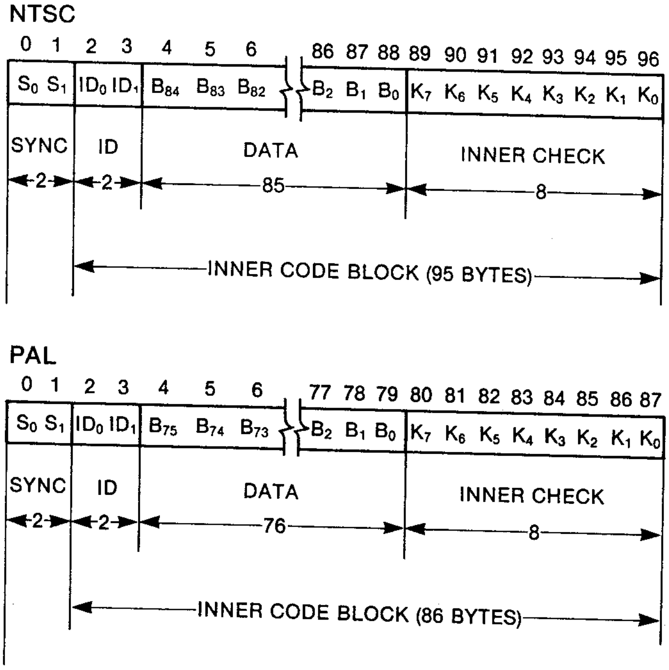

NTSC
0 1 2 3 4 5 6 86 87 88 89 90 91 92 93 94 95 96
S_0 S_1 ID_0 ID_1 B_{84} B_{83} B_{82} B_2 B_1 B_0 K_7 K_6 K_5 K_4 K_3 K_2 K_1 K_0
SYNC
ID
DATA
INNER CHECK
2
2
85
8
INNER CODE BLOCK (95 BYTES)
PAL
0 1 2 3 4 5 6 77 78 79 80 81 82 83 84 85 86 87
S_0 S_1 ID_0 ID_1 B_{75} B_{74} B_{73} B_2 B_1 B_0 K_7 K_6 K_5 K_4 K_3 K_2 K_1 K_0
SYNC
ID
DATA
INNER CHECK
2
2
76
8
INNER CODE BLOCK (86 BYTES)

Fig. 21 Video Block Structure

ID:

ID0	ID1

ID0:

(LSB) 0	1	2	3	4	5	6	7 (MSB)
B0	B1	B2	B3	B4	B5	B6	B7

ID1 (Video sector):

(LSB) 0	1	2	3	4	5	6	7 (MSB)
B8	S0	S1	S2	F0	F1	F2	V/A

Segment number S2=0 Field number =0

ID1 (Audio sector):

(LSB) 0	1	2	3	4	5	6	7 (MSB)
B8	S0	S1	S2	F0	F1	F2	V/A

Segment number S2=0 Field number =1

Fig. 22 ID Code

(7) Inner ECC Encoder
This circuit produces the Inner Error Correction code block shown above, the code consists of 8 bytes. By adding this code up to four errors per block in the playback signal can be corrected, and four errors marked for correction by the Outer error correction circuit.

(8) M-SEQ ADD (Maximum Length Sequence Addition)
M-SEQ is a circuit which minimizes the sequence of continuous 1's or 0's, which is difficult to record. This is achieved by generating random signals of 1 and 0 and adding them to the data that is to be recorded. During playback the M-SEQ circuit restores the data to the original state.

(9) 8-14 Conversion (Eight to Fourteen Modulation)
Eight to Fourteen Modulation converts 8 bit data into 14 bit data. The 14 bit data is used to minimise the DC component and frequency range. This operation sets the minimum sequence of bits to 2 and the maximum to 7. As a result both the high and low frequency range is reduced. (8 bits = 1 byte, 14 bits = 1 word).

(10) SYNC and RUNUP add
The track is composed of the following sectors:

Audio sector 1
Audio sector 2
Video sector
Audio sector 3
Audio sector 4

Each sector begins with either Runup 0 or Runup 1. Each track begins with Runup 0, and repeats the pattern of 0011 for 50 words, all the other sectors in that track begin with the Runup 1, this pattern is also 0011 but repeats for 20 words. This process of Runup bits is used to lock the playback clock PLL to the playback data. Sync bits, which comprise two 14 bit patterns, are used to detect the start of each block.

Runup 0, Runup 1
    Runup A: 01100001111001 10011110000110
    Runup B: 10011110000110 01100001111001
Runup 0=50 word, Runup 1=20 word
Sync (Selection of sync A and sync B is to be by 8/14 rule):
    Sync A: 00110011100110 00001110001111
    Sync B:11001100011001 11110001110000

Fig. 23 Sync and Runup

1 TRACK SCAN

1 TRACK SCAN

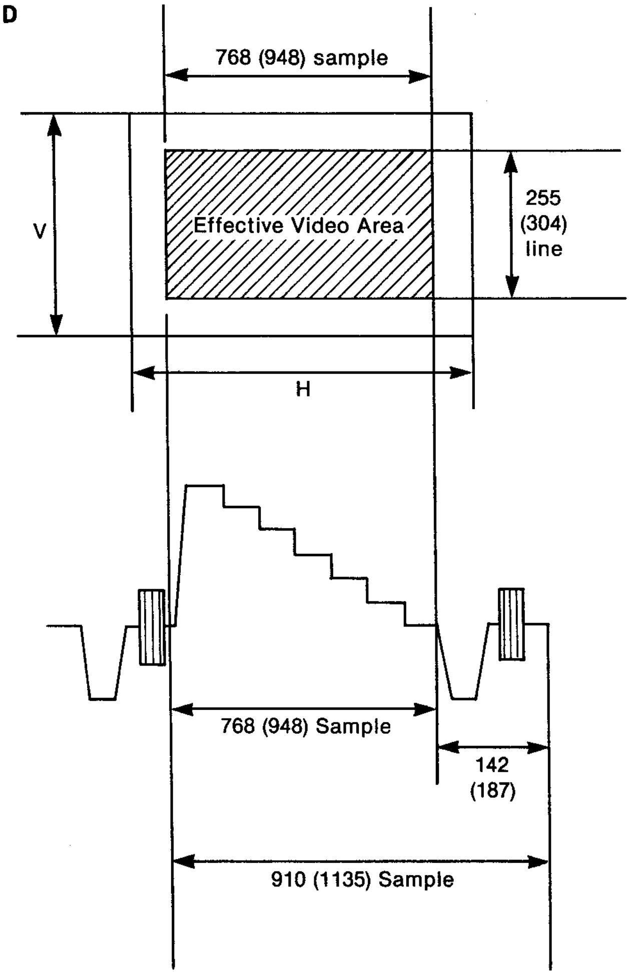
SEC-TOR	NO.	NAME	BLOCK SIZE	BLOCK				
A4	19	Post			Sync	ID		
	18	Audio sector 4	8 Block		Sync	ID	Data	Inner check
	17	Pre 1		Runup 1	Sync	ID	Space	
A3	16	Gap						
	15	Post			Sync	ID		
	14	Audio sector 3	8 Block		Sync	ID	Data	Inner check
	13	Pre 1		Runup 1	Sync	ID	Space	
V	12	Gap						
	11	Post			Sync	ID		
	10	Video sector	NTSC 408 Block PAL 498 Block		Sync	ID	Data	Inner check
	9	Pre 1		Runup 1	Sync	ID	Space	
A2	8	Gap						
	7	Post			Sync	ID		
	6	Audio sector 2	8 Block		Sync	ID	Data	Inner check
	5	Pre 1		Runup 1	Sync	ID	Space	
A1	4	Gap						
	3	Post			Sync	ID		
	2	Audio sector 1	8 Block		Sync	ID	Data	Inner check
	1	Pre 0		Runup 0	Sync	ID	Space	

A1, A2, A3, A4=AUDIO SECTOR
V=VIDEO SECTOR

Track Format

Fig. 24 Track Format

1. A/D


768 (948) sample
V
Effective Video Area
255
(304)
line
H
768 (948) Sample
142
(187)
910 (1135) Sample

Sample 0, 2, 4, ... → CH0

Sample 1, 3, 5, ... → CH1

NTSC
1 Line effective sample number
=768 sample/line
1 Field effective sample number
=768 sample/line × 255 line
=195,840 sample/Field

195,840 sample/2=97,920 sample
CH0=97,920 sample/Field
CH1=97,920 sample/Field

PAL
1 Line effective sample number
=948 sample/line
1 Field effective sample number
=948 sample/line × 304 line
=288,192 sample/Field

288,192 sample/2=144,096 sample
CH0=144,096 sample/Field
CH1=144,096 sample/Field

Fig. 25 A/D Sampling

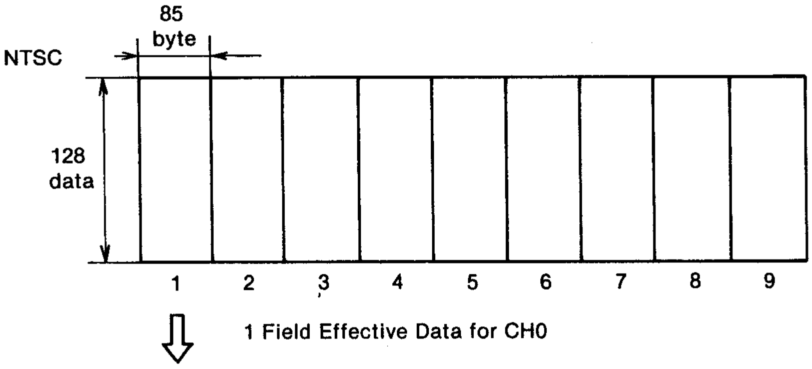
2. LINE SHUFFLE

CH0 D0 D2 D4 S6 D8 ...... D766 D10 D8 D766 D570 D64 ......
CH1 D1 D3 D5 S7 D9 ...... D767 D431 D315 D3 D767 D21 ......

←— 1H —→ ←— 1H —→

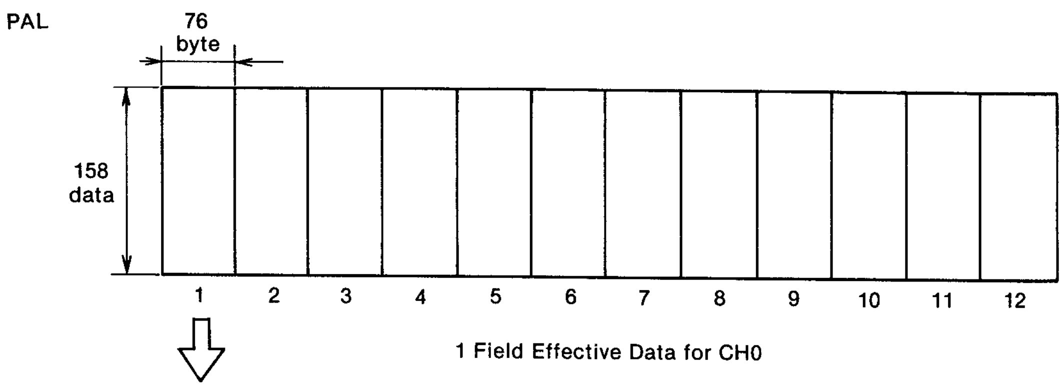
Before Line Shuffle ⇨ After Line Shuffle

3. FIELD MEMORY


85
byte
NTSC
128
data
1
2
3
4
5
6
7
8
9
1 Field Effective Data for CH0

85 byte × 128 data=10,880 byte/Product code
10,880 byte/Product code × 9 Product code/Field=97,920 byte/Field
(1 Sample...1 byte)

Fig. 26-1 NTSC 1 Field Memory (CH0)


PAL
76 byte
158 data
1
2
3
4
5
6
7
8
9
10
11
12
1 Field Effective Data for CH0

76 byte × 158 data = 12,008 byte/Product code
12,008 byte/Product code × 12 Product code/Field = 144,096 byte/Field
(1 Sample...1 byte)

Fig. 26-1 PAL 1 Field Memory (CH0)

4. OUTER ECC

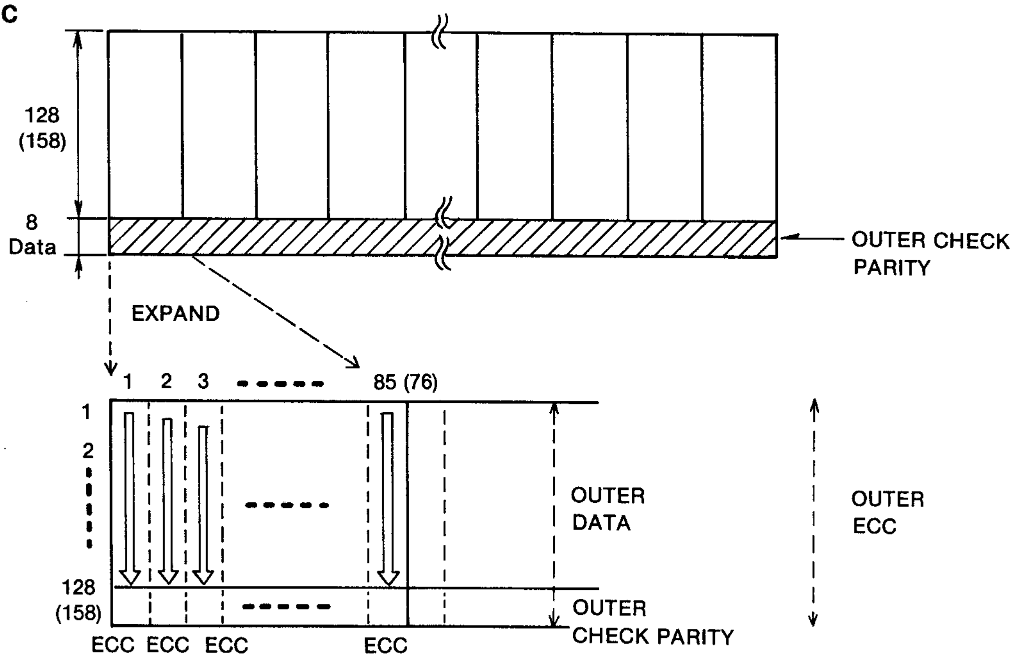

128
(158)
8
Data
OUTER CHECK PARITY
EXPAND
1 2 3 85 (76)
1
2
128
(158)
OUTER DATA
OUTER CHECK PARITY
OUTER ECC
ECC ECC ECC ECC

Fig. 27 Outer ECC

5. FIELD SHUFFLE

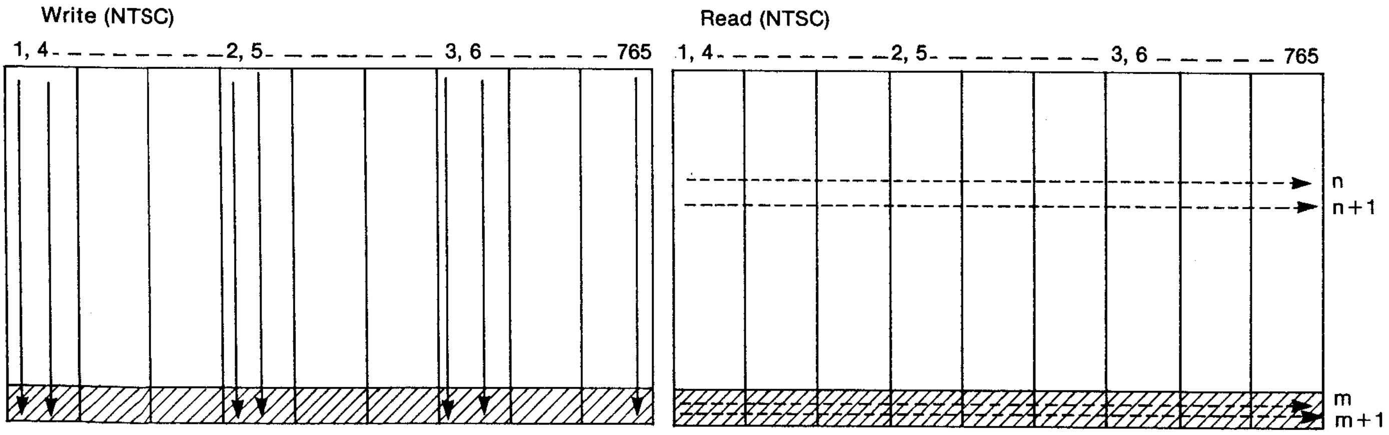

Write (NTSC)
1, 4
2, 5
3, 6
765
Read (NTSC)
1, 4
2, 5
3, 6
765
n
n+1
m
m+1

Fig. 28 Field Shuffle

6. INNER ECC

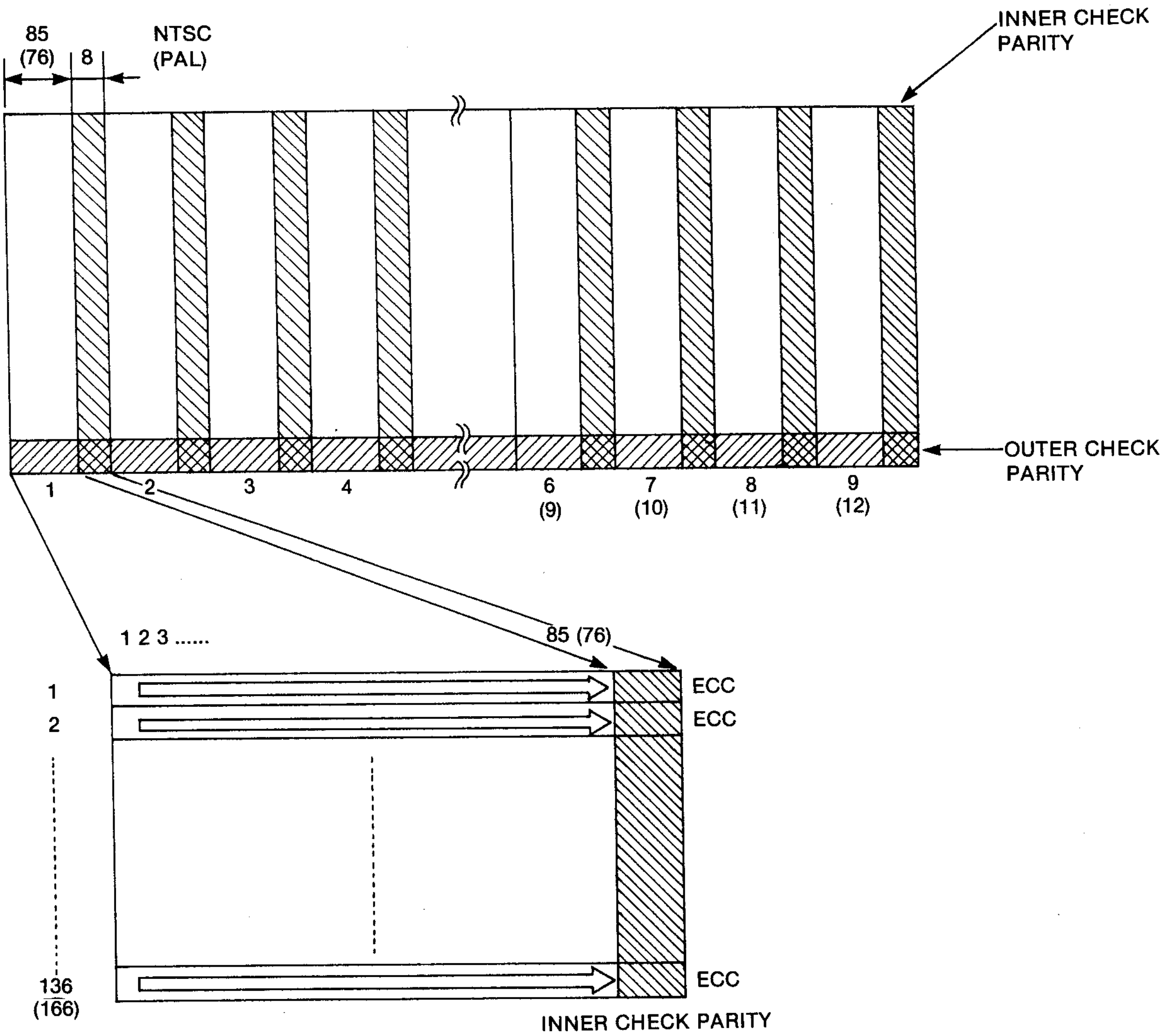
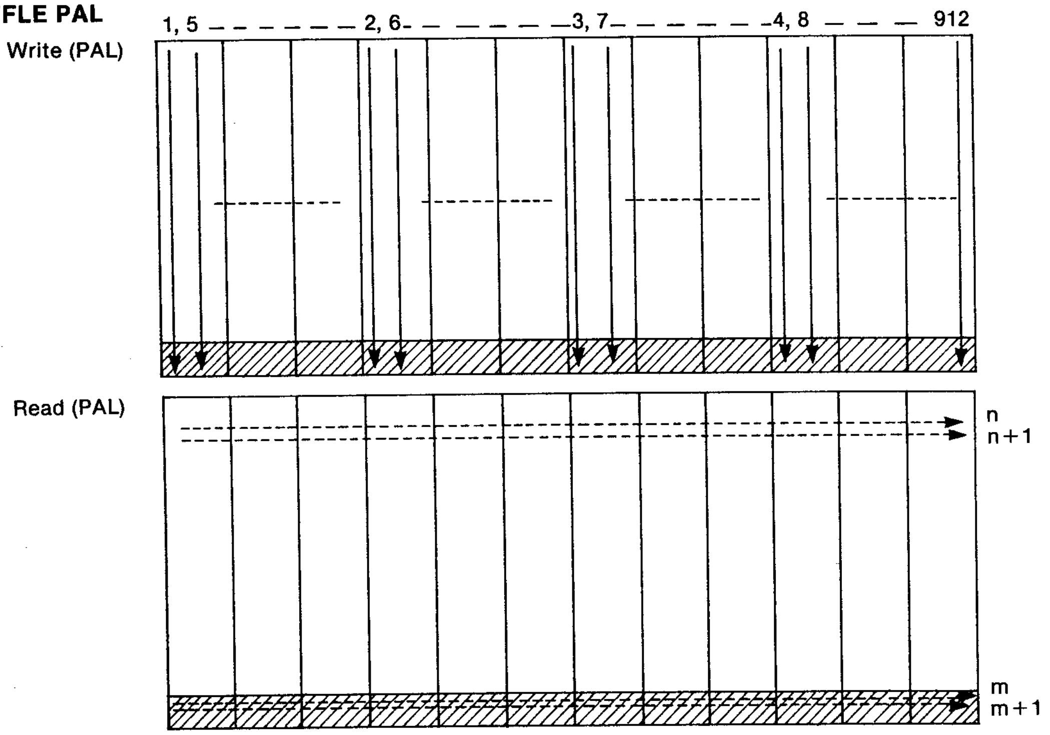
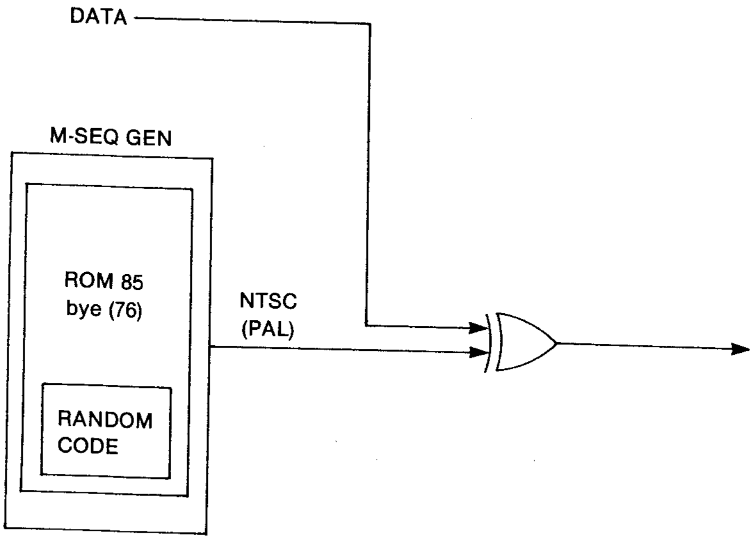

85
(76)
8
NTSC
(PAL)
INNER CHECK PARITY
OUTER CHECK PARITY
1
2
3
4
6
(9)
7
(10)
8
(11)
9
(12)
1 2 3 ......
85 (76)
1
2
136
(166)
ECC
ECC
ECC
INNER CHECK PARITY

Fig. 29 Inner ECC

7. FIELD SHUFFLE PAL


Write (PAL)
1, 5
2, 6
3, 7
4, 8
912
Read (PAL)
n
n+1
m
m+1

8. M-SEQ


DATA
M-SEQ GEN
ROM 85
bye (76)
RANDOM
CODE
NTSC
(PAL)

M-SEQ ADD CIRCUIT

10. SYNC, ID

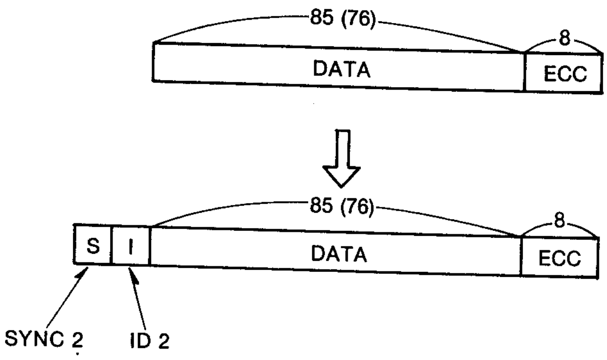
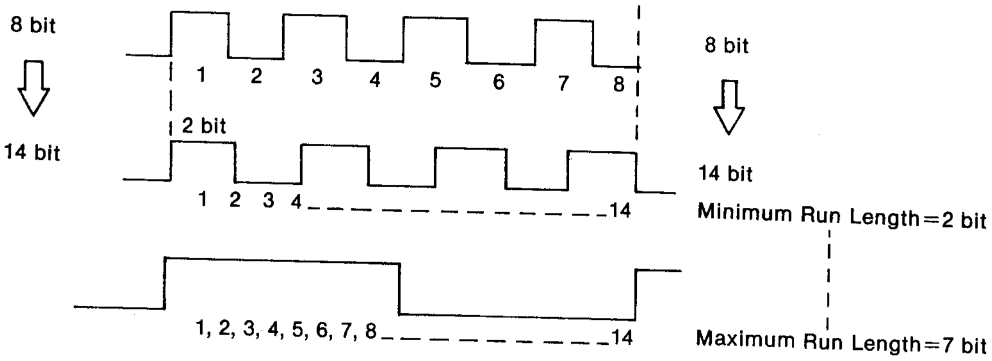

85 (76)
8
DATA
ECC
85 (76)
8
S
I
DATA
ECC
SYNC 2
ID 2

Fig. 30 Sync, ID

9. 8 to 14 Modulation


8 bit
14 bit
1 2 3 4 5 6 7 8
2 bit
8 bit
14 bit
1 2 3 4 14
Minimum Run Length=2 bit
1, 2, 3, 4, 5, 6, 7, 8 14
Maximum Run Length=7 bit

(11) P/S (Parallel to Serial Converter) Circuit
The P/S circuit converts the 14-bit data into serial data to be recorded onto tape.

(12) Recording Amplifier (Rec Amp)
The serial data are supplied to Rec Amp. Head switching is used to switch the data between heads CH0A and CH0B, and CH1A and CH1B heads.

The 4T GEN,(4 clock pulse generator, refer to the RF Block Diagram), is a reference generator designed to operate while adjusting the recording current. The record current adjustment is available on the AJ-D350 Front Panel Test Mode Menu.

ENV DET (Envelope Detector) is used in the adjustment of the tracking. The playback heads are Auto-Tracking, therefore this tracking adjustment will not have a noticeable effect on their operation. The Record heads are not Auto-Tracking, therefore the playback signal from the these heads is used to set the Tracking. Tracking should be checked before editing.

RF REC/PB Block Diagram

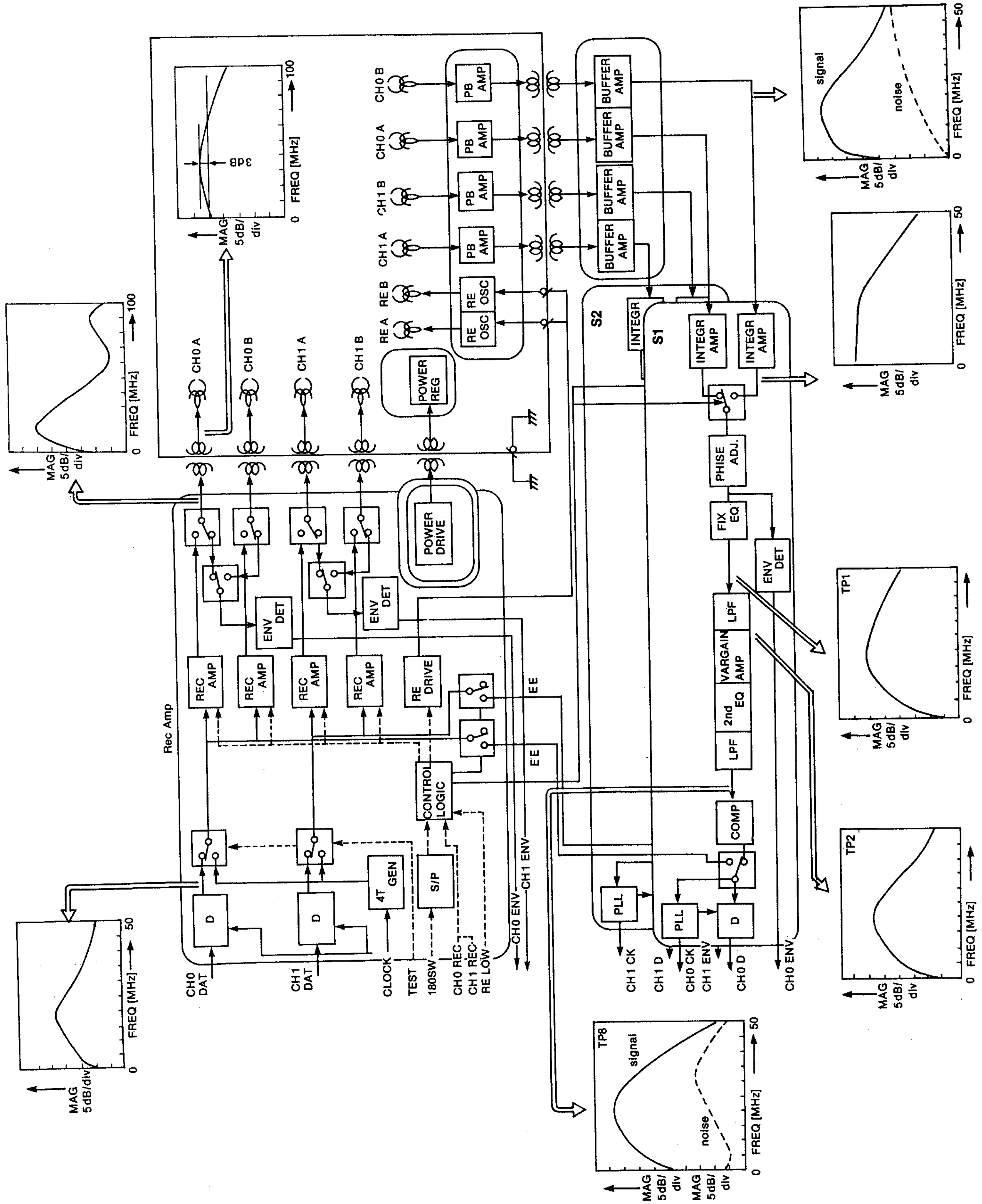

CH0 B
CH0 A
CH1 B
CH1 A
RE B
RE A
PB AMP
PB AMP
PB AMP
PB AMP
RE OSC
RE OSC
BUFFER AMP
BUFFER AMP
BUFFER AMP
BUFFER AMP
POWER REG
POWER DRIVE
CH0 A
CH0 B
CH1 A
CH1 B
S2
S1
INTEGR
INTEGR AMP
INTEGR AMP
PHISE ADJ.
FIX EQ
ENV DET
LPF
VARGAIN AMP
2nd EQ
LPF
COMP
PLL
PLL
D
CH1 CK
CH1 D
CH0 CK
CH1 ENV
CH0 D
CH0 ENV
Rec Amp
REC AMP
REC AMP
REC AMP
REC AMP
RE DRIVE
ENV DET
ENV DET
CONTROL LOGIC
EE
EE
D
D
4T GEN
S/P
CH0 DAT
CH1 DAT
CLOCK
TEST
180SW
CH0 REC
CH1 REC
RE LOW
CH0 ENV
CH1 ENV
MAG 5dB/div
FREQ [MHz]
0
100
3dB
50
signal
noise
TP1
TP2
TP8
MAG 5dB/div
MAG 5dB/div

Fig. 31 RF Block Diagram

Playback Circuit

(1) PB Amp, RF Circuit
Signals regenerated in the heads, are amplified by the PB AMP on the drum unit, and sent via rotary transformers to the Buffer Amp. The signals from head CH0 are sent to Board S1 and those of head CH1 to Board S2. Boards S1 and S2 have the same structure, therefore, only the operation of Board S1 will be descrived:

The output from the Buffer Amp is input to the Integrating Amp. The off tape waveform is reproduced with differential characteristics due to the magnetic recording process. These are eliminated in this amplifier.

After passing through the Integrate Amp, the phase of the waveform is compensated by the Phase Adjustment Circuit with the head switched.

Fix EQ and 2nd EQ compensate the playback frequency response.
Fix EQ mainly operates at the low frequencies, while the 2nd EQ operates at the higher frequencies. COMP is a comparator which provides waveform shaping. Each channel has a PLL circuit which is locked to the off tape data, the PLL output, called the playback clock, contains jitter components from each head. This clock is used as the write clock for each channel of data into memory.

(2) S/P (Serial to Parallel) Circuit
This circuit restores the regenerated data to the original 14-bit parallel signals.

(3) Sync Detect and Protect
This circuit detects the Sync at the start of the data block. If the Sync is mis-read, the whole block is lost. If this occurs the next sync will be detected for the identification of the block. The sync is used to lock a counter in a similar way that Horizontal sync in the composite television signal is used to lock the Horizontal Oscillator.

(4) 14 - 8 (Eight to Fourteen Demodulator) Circuit
The 8-14 Demodulator is a ROM, the 14-bit data is input as the address of the ROM and outputs the 8-bit data corresponding to the addresses is read out.

(5) M-SEQ DEC (Maximum Length Sequence Decoder)
The M-SEQ decoder removes the random data that was added to the record data by the M-SEQ addition circuit.

(6) Inner ECC Decoder
Up to four errors in a block can be corrected by the 8-word Inner ECC. When five to eight errors occur a flag is set. These flagged errors, plus four more, will be corrected by the Outer ECC. Any further errors will be concealed.

BLOCK DIAGRAM OF PB CIRCUIT

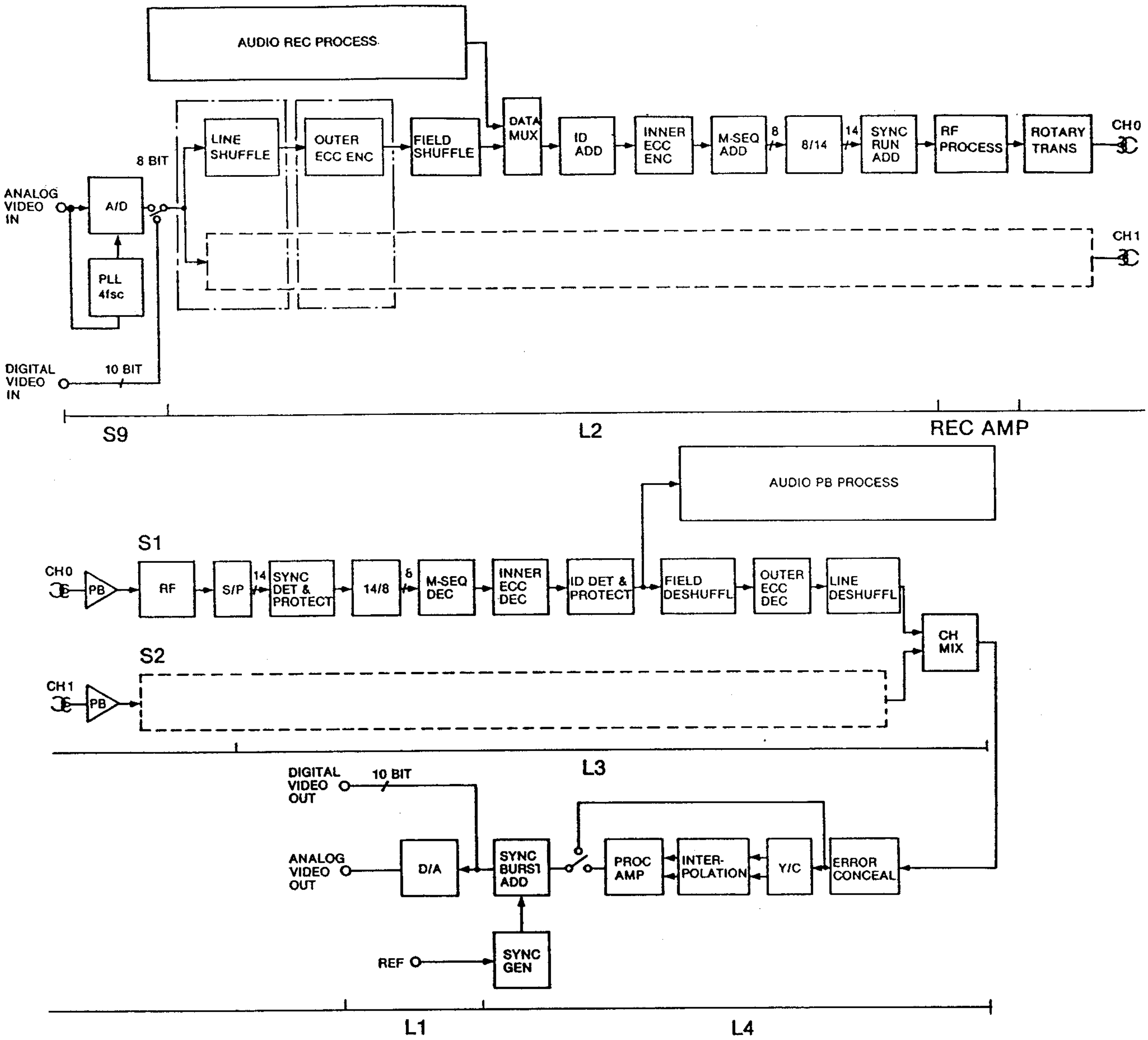

AUDIO REC PROCESS
ANALOG VIDEO IN
A/D
PLL 4fsc
8 BIT
DIGITAL VIDEO IN
10 BIT
LINE SHUFFLE
OUTER ECC ENC
FIELD SHUFFLE
DATA MUX
ID ADD
INNER ECC ENC
M-SEQ ADD
8
8/14
14
SYNC RUN ADD
RF PROCESS
ROTARY TRANS
CH0
CH1
S9
L2
REC AMP
AUDIO PB PROCESS
S1
CH0
PB
RF
S/P
14
SYNC DET & PROTECT
14/8
8
M-SEQ DEC
INNER ECC DEC
ID DET & PROTECT
FIELD DESHUFFL
OUTER ECC DEC
LINE DESHUFFL
CH MIX
S2
CH1
PB
L3
DIGITAL VIDEO OUT
10 BIT
ANALOG VIDEO OUT
D/A
SYNC BURST ADD
PROC AMP
INTER-POLATION
Y/C
ERROR CONCEAL
REF
SYNC GEN
L1
L4

Fig. 32 Video Recording & Playback Block Diagram

(7) ID Detect and Protect
During the record process each block was given an ID number, this number identifies the block position in the field memory. This circuit detects the ID assigned to each block. Block numbers are recorded sequentially and a counter is provided to compare the detected ID number with the recorded one to prevent ID detection errors occurring. The output from the ID Detect and Protect Circuit is separated into two sections, the audio section and the video section.

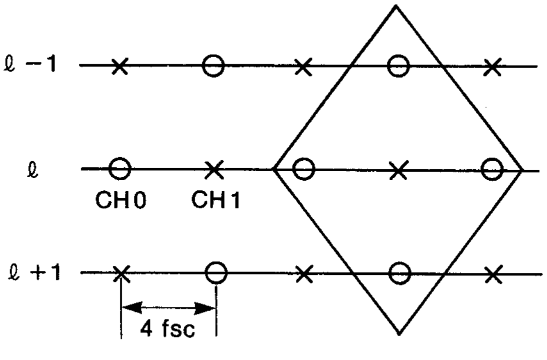
(8) Field Deshuffle Circuit
This circuit restores the data to the state before Field Shuffling was applied.

(9) Outer ECC Decoder
The Outer ECC Decoder, uses an 8 word error correction code to correct up to eight errors when they occur in one segment column.

(10) Line Deshuffle
This circuit restores the data to the original state before Line Shuffle was applied.

(11) CH MIX
Channel Mix Circuit mixes signals CH0 and CH1 signals.

(12) Error Concealment
The data which Inner and Outer error correction circuits have failed to correct are concealed by the Error Conceal Circuit. The Error Conceal Circuit consists of 2D, and 3D, (2 and 3 dimensional) concealment circuits. If 2D concealment fails to conceal the errors, then 3D concealment is used. Error Concealment can still operate when one of the heads is clogged. For example, if the data of CH1 head is missing, more than 10 adjacent data samples are used for compensation.



1 Head Error

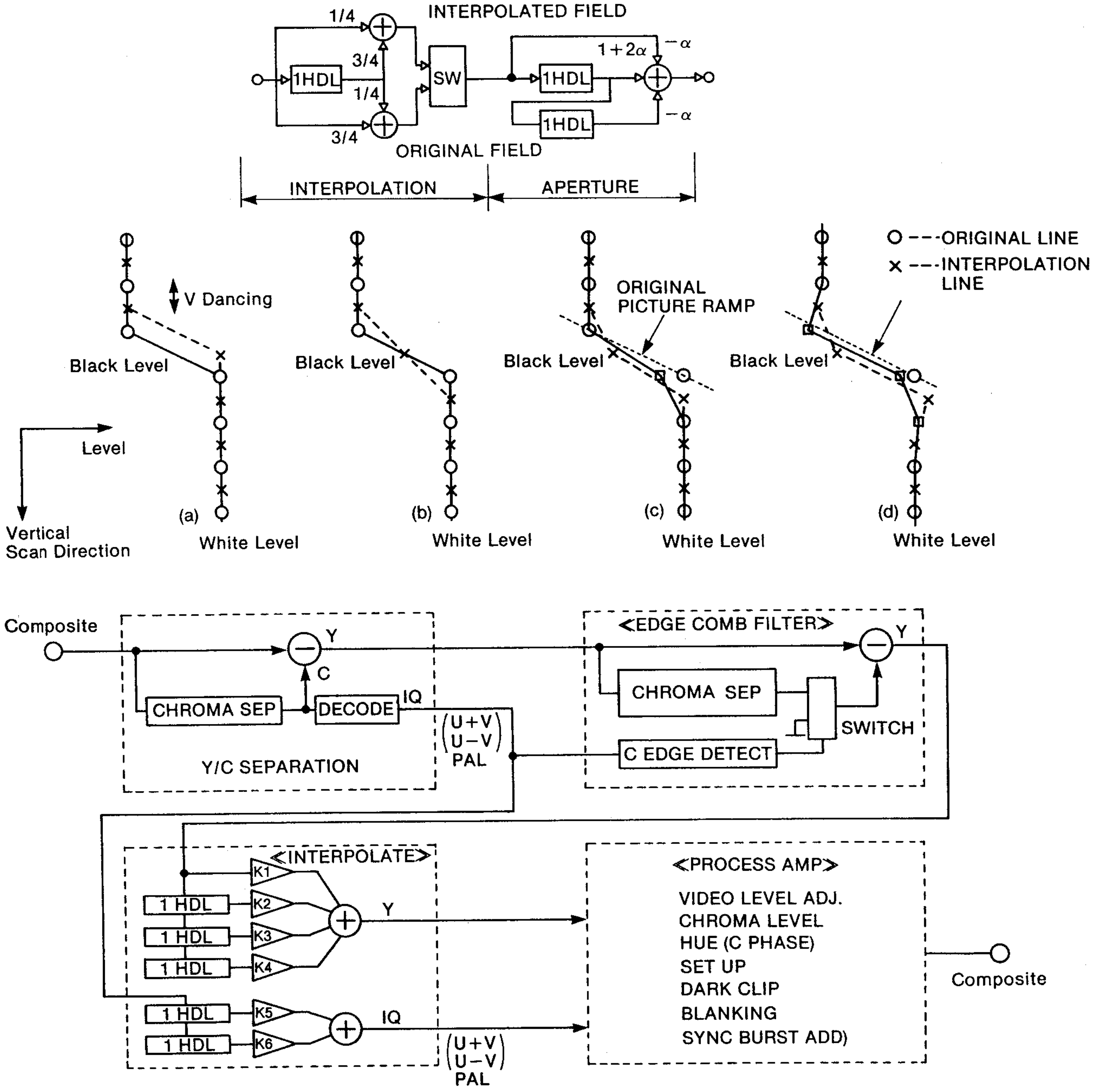
Fig. 33 Error Conceal Concept

(13) Y/C Separation Circuit

This is a composite VTR, so we cannot adjust luminance and chrominance signals independently if they remain as composite signals. A Y/C Separation Circuit is used to separate them to permit independent adjustment.

(14) Interpolation Circuit

When auto-tracking slow motion playback is performed the fields of the playback signals are not necessarily in the correct odd / even field sequence. Some fields may be skipped or the same field may appear twice. If this occurs it is necessary to interpolate them to produce the correct odd / even sequence. Depending on how good the Interpolation circuit the slow motion picture quality will be affected. The playback picture may move up and down in the vertical direction or the vertical resolution may be reduced.



1/4
INTERPOLATED FIELD
3/4
1HDL
1/4
3/4
SW
1+2α
−α
1HDL
1HDL
−α
ORIGINAL FIELD
INTERPOLATION
APERTURE
O ---ORIGINAL LINE
× ---INTERPOLATION LINE
V Dancing
Black Level
ORIGINAL PICTURE RAMP
Level
Vertical Scan Direction
(a)
(b)
(c)
(d)
White Level
Composite
Y
C
CHROMA SEP
DECODE
IQ
Y/C SEPARATION
(U+V U−V) PAL
<EDGE COMB FILTER>
CHROMA SEP
SWITCH
C EDGE DETECT
<INTERPOLATE>
K1
K2
K3
K4
K5
K6
1 HDL
Y
IQ
<PROCESS AMP>
VIDEO LEVEL ADJ.
CHROMA LEVEL
HUE (C PHASE)
SET UP
DARK CLIP
BLANKING
SYNC BURST ADD)
Composite

Fig. 34 Interpolation Circuit

(15) Process Amp

Process Amp can adjust the video level, chroma level, chroma phase (Hue), set up level, dark clip, blanking , etc. Each of these can be set using the menu on the front panel. The output from the Process Amp is sent to a changeover switch. This changeover switch allows switching between two states, to use or by-pass the Process Amp. When items such as chroma level are set to "variable", the Process Amp is selected. When "unity" is selected the Process amplifier is by-passed.

(16) Sync Burst Add

Sync and Burst synchronized with the reference or input video signals replace the playback sync and burst signals.

(17) Digital Output and D/A Converter

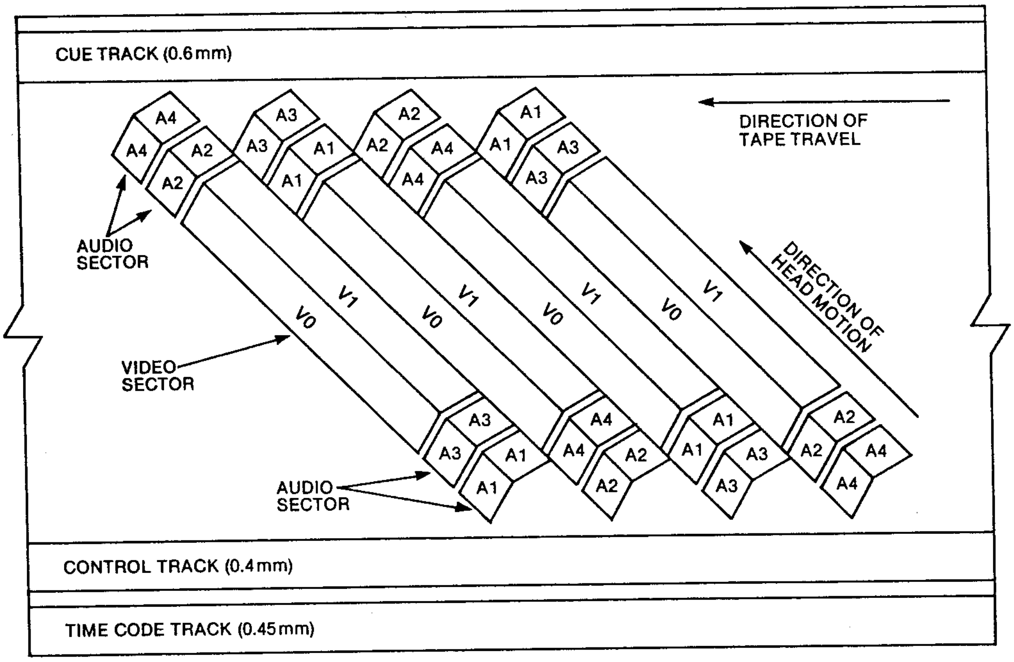
After the Sync and Burst have been mixed with the playback video signal they are output as 10 bit digital signals, and via a D-to-A converter as composite video.

11. Audio circuit

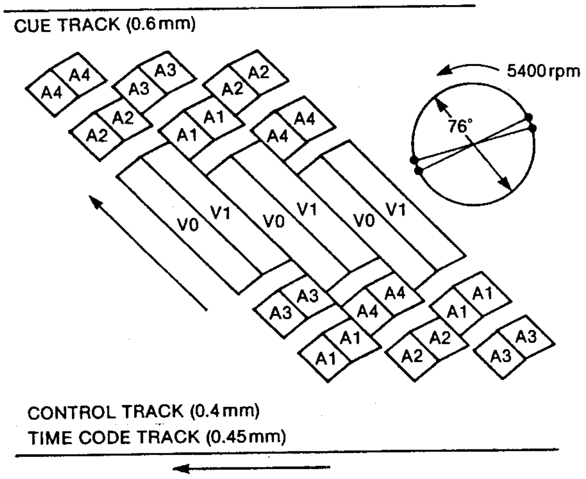
1). Format of the tape

The tape used is a 1/2 - inch metal tape, which has a single 0.6mm wide analog cue audio track and 4 PCM audio channels on which the PCM audio signal is recorded, together with the video signal. In the PAL system, one field has eight tracks, with the twin head recording signals in CH0 and CH1, which results in each field having four pairs of tracks. In the NTSC system, one field has six tracks, the twin head records signals on CH0 and CH1 which results in each field having three pairs of tracks. The PCM audio tracks are divided into A1 to A4, Audio signal channel 1 to channel 4, and the special allocation is adopted, so that signal corrections can be made in case the tape is damaged.

In audio insert editing mode, only single channel insert editing can be performed. Setting the pairs of tracks to the same channel by classifying them as A1 and A1 makes insert editing easy to control and will prevent problems in the event of the twin head running on the wrong tracks.


CUE TRACK (0.6mm)
DIRECTION OF TAPE TRAVEL
DIRECTION OF HEAD MOTION
AUDIO SECTOR
VIDEO SECTOR
AUDIO SECTOR
A1
A2
A3
A4
V0
V1
CONTROL TRACK (0.4mm)
TIME CODE TRACK (0.45mm)

Location of recorded tracks (PAL)


CUE TRACK (0.6mm)
5400rpm
76°
A1
A2
A3
A4
V0
V1
CONTROL TRACK (0.4mm)
TIME CODE TRACK (0.45mm)

Location of recorded tracks (NTSC)

Fig. 35 Audio Location of Recorded Tracks

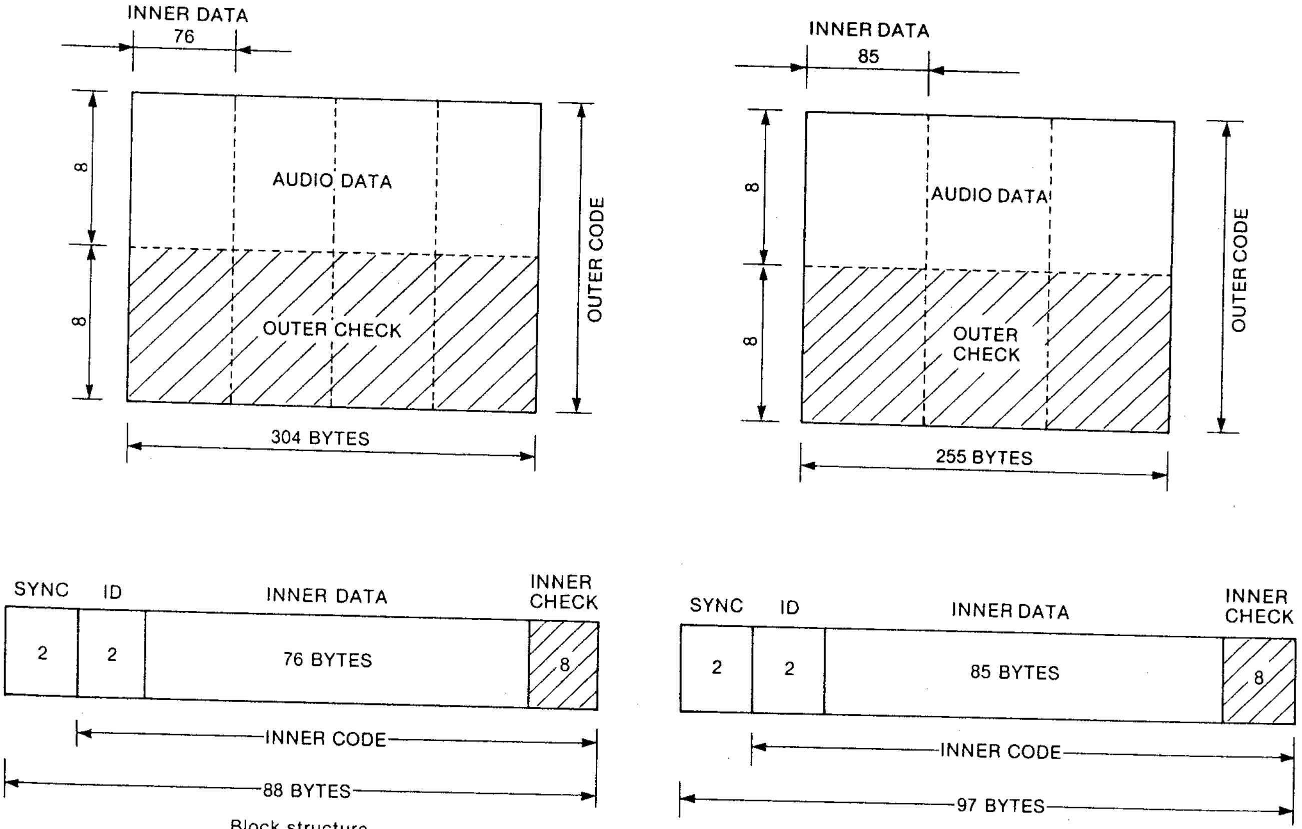
In PAL and NTSC systems, one block in a track (having 88 and 97 bytes space respectively), consists of four codes:

SYNC
ID
INNER DATA
INNER CHECK.

- SYNC is used to detect the recording start point.
- ID contains the block numbers in consecutive order.
- INNER DATA contains the recorded sample data.
- INNER CHECK is for checking INNER DATA errors.

The number of data samples in one NTSC field is 960 (at 59.94 Hz/Field) which is not divisible by the frequency of 48 KHz. Therefore, block numbers #1 to 5 represent the values 801, 801, 801, 801 and 800 respectively, which are all recorded in the ID code, data in one field are recorded in a sequence with the #1 to 5 as one cycle.

Audio insert editing is performed by following the sequence above.


INNER DATA
76
8
8
AUDIO DATA
OUTER CHECK
OUTER CODE
304 BYTES
INNER DATA
85
8
8
AUDIO DATA
OUTER CHECK
OUTER CODE
255 BYTES
SYNC
ID
INNER DATA
INNER CHECK
2
2
76 BYTES
8
INNER CODE
88 BYTES
SYNC
ID
INNER DATA
INNER CHECK
2
2
85 BYTES
8
INNER CODE
97 BYTES

Block structure

PAL

Block structure

NTSC

Fig. 36 Audio 1 Field Memory (CH1) and Block Structure

2). Audio REC circuit

The audio input is divided into analog XLR and digital AES/EBU formats, each of which has four channels. However, with the two channel signal sent via a single connector in the AES/EBU format, there are two channels for the connector input and two for the output.

The analog input signal is converted into a 20-bit digital signal in the A/D converter, where the digital signal converted from the analog signal and the AES/EBU format digital signal are selected. The audio signal is sent to the crossfade circuit which fades-out and fades-in the playback and recording modes respectively, to achieve a glitch free audio signal at the editing point.

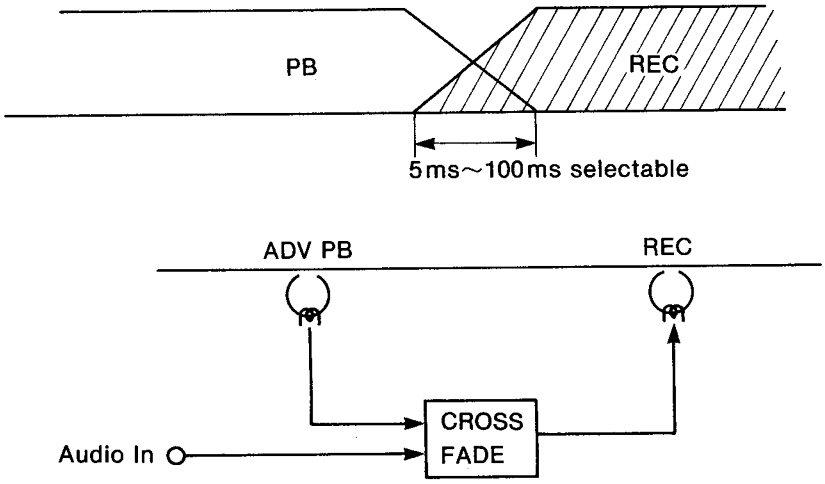


Fig. 37 Audio Signal Editing Point

The audio format is created by the field and a buffer memory in the recording circuit. This is then mixed with the video signal containing the ID and Inner Correction codes and 8/14-modulated.

Finally, after going through the RF circuit, it is registered in the recording head.

PCM AUDIO BLOCK DIAGRAM

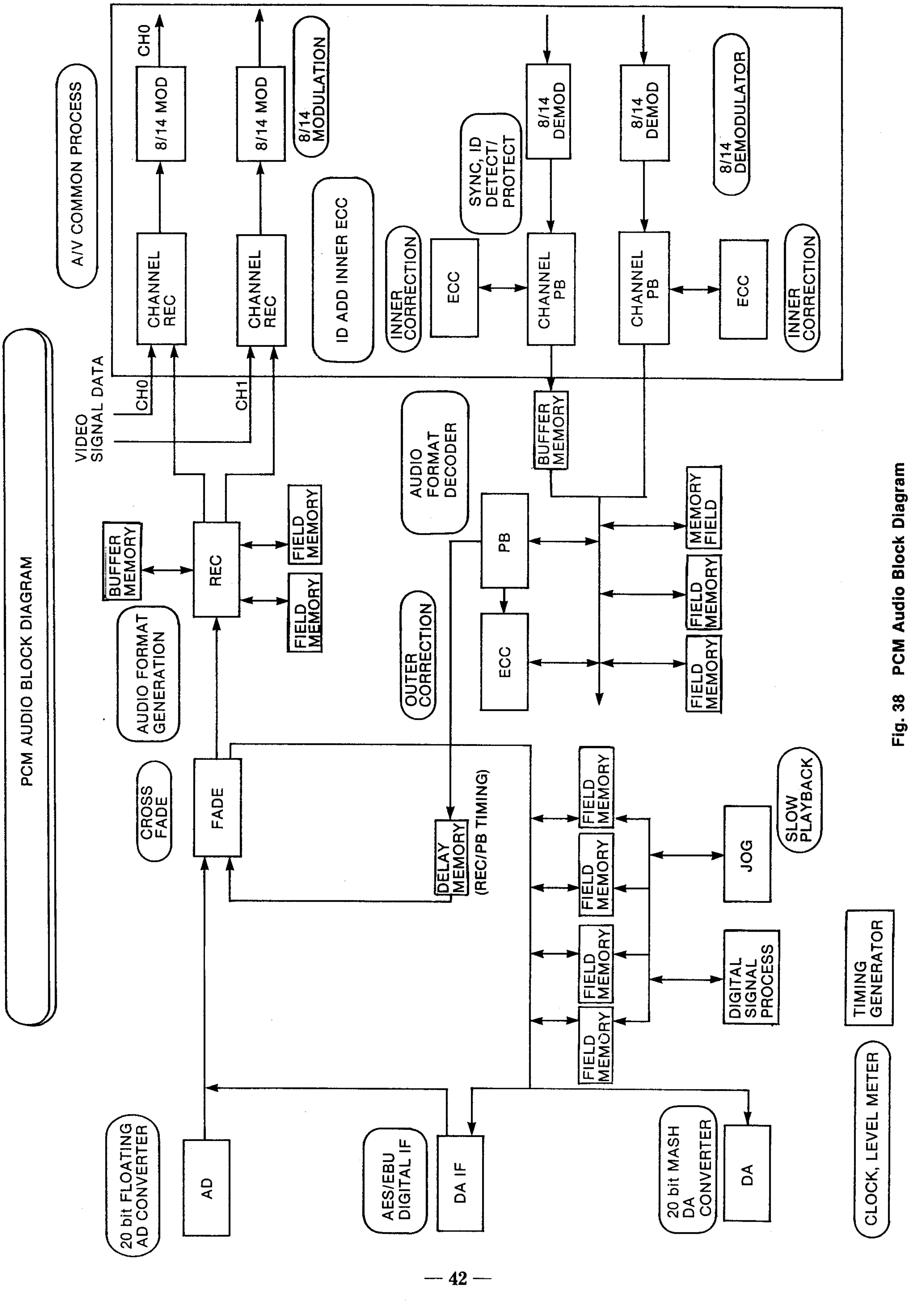

PCM AUDIO BLOCK DIAGRAM
A/V COMMON PROCESS
CH0
8/14 MOD
8/14 MOD
8/14 MODULATION
CHANNEL REC
CHANNEL REC
ID ADD INNER ECC
INNER CORRECTION
ECC
SYNC, ID DETECT/ PROTECT
8/14 DEMOD
8/14 DEMOD
8/14 DEMODULATOR
CHANNEL PB
CHANNEL PB
ECC
INNER CORRECTION
VIDEO SIGNAL DATA
CH0
CH1
BUFFER MEMORY
REC
FIELD MEMORY
FIELD MEMORY
AUDIO FORMAT GENERATION
AUDIO FORMAT DECODER
BUFFER MEMORY
PB
MEMORY FIELD
FIELD MEMORY
FIELD MEMORY
ECC
OUTER CORRECTION
CROSS FADE
FADE
DELAY MEMORY
(REC/PB TIMING)
FIELD MEMORY
FIELD MEMORY
FIELD MEMORY
FIELD MEMORY
JOG
SLOW PLAYBACK
DIGITAL SIGNAL PROCESS
TIMING GENERATOR
CLOCK, LEVEL METER
20 bit FLOATING AD CONVERTER
AD
AES/EBU DIGITAL IF
DA IF
20 bit MASH DA CONVERTER
DA

Fig. 38 PCM Audio Block Diagram

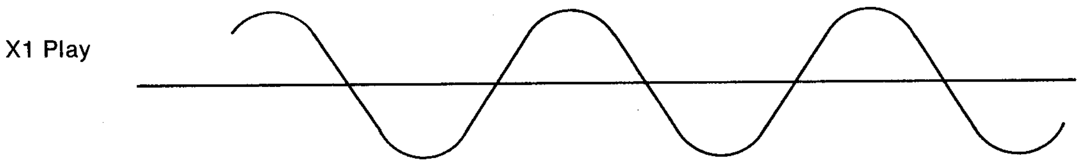
3). Audio PB circuit

After going through the head and the RF circuit, the audio playback signal executes 8/14-demodulation, detects the SYNC and ID and divides them into blocks. Also, based on the inner correction code, it corrects the inner errors.

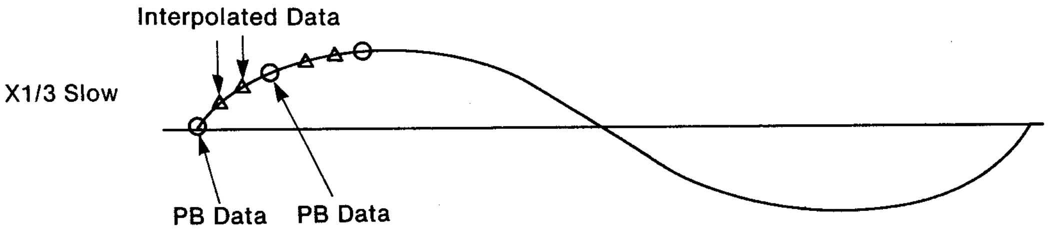
In the playback circuit, the audio format is decoded, with the outer errors corrected. Then the audio playback data is sent to the delay memory to synchronize the timing of the audio signal with that of the video signal.

The audio playback data then goes through the crossfade circuit and into the audio slow-playback circuit, where data error correction is performed which enables the sound to be heard in the JOG mode.

For example, at 1/3x normal speed, interpolation is necessary.



(a) Audio Normal Playback



(b) Audio Slow Playback

Fig. 39 Audio Slow Playback

The PCM sound is muted when played back in the SHUTTLE mode. To monitor it in this mode it is necessary to record the PCM sound on the CUE track.

The PCM sound recorded on the four channels can be mixed together, or any desired chanell can be selected and mixed.

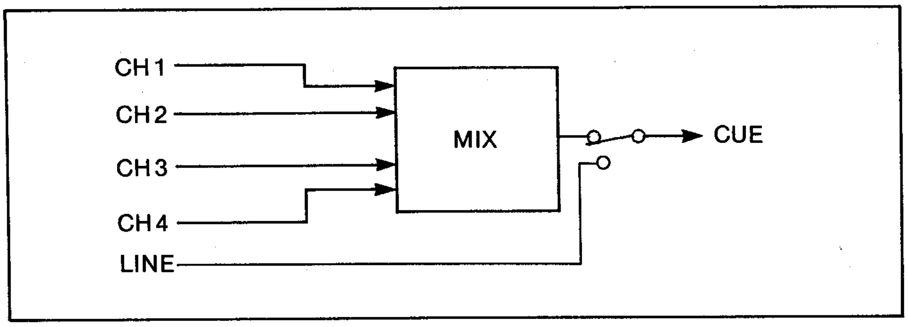


Fig. 40 Cue Selection

Trimming memory

In order to set an Audio IN point - which is more difficult than setting a Video IN point - register in the trimming memory the five second source sound data on the master VTR and another five second sound data on the slave VTR together with the T/C. In this way, the audio IN point can be set by the registered memories alone without having to run the tape.

12. System Control and Front Panel

Refer to the System control and Front Panel Block Diagrams.
The System control uses an 8 bit CPU (HD64180) which is a Z80 upwards compatible CPU.
The Communication Microcomputer controls communication of RS-422, RS-232C and GP-IB. RS-422 is used for the editing controller and RS-232C is used for connection to a personal computer or modem. A personal computer connected to the AJ-D350 can control it remotely, save or load internal setting files and check the diagnostic.

The purpose of the V/A microcomputer is follows.
- Diagnostic, Error rate monitoring
- Electronics VR
- Connection with V/A controller

The front panel display is a 640 dot x 200 dot EL panel which uses a 16 bit (68000) CPU to generate the graphics.

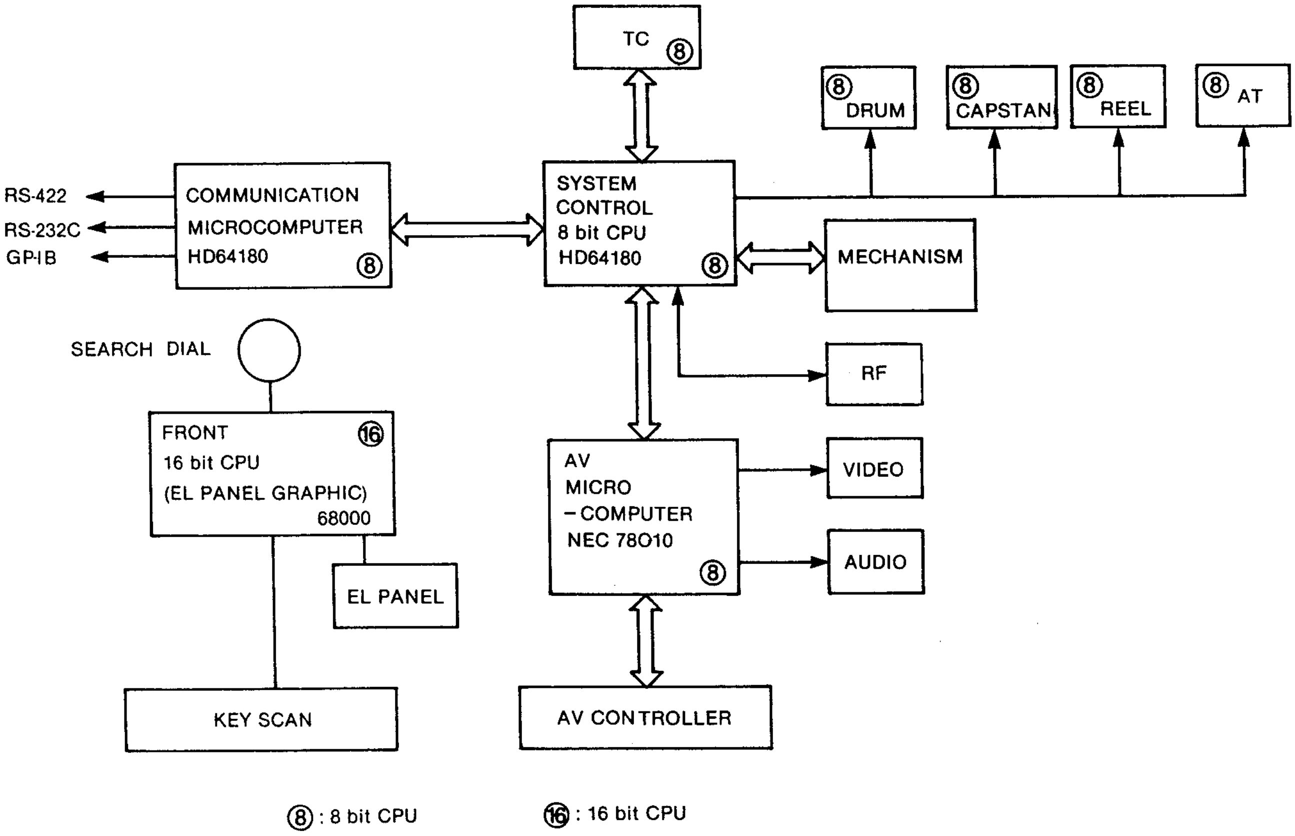
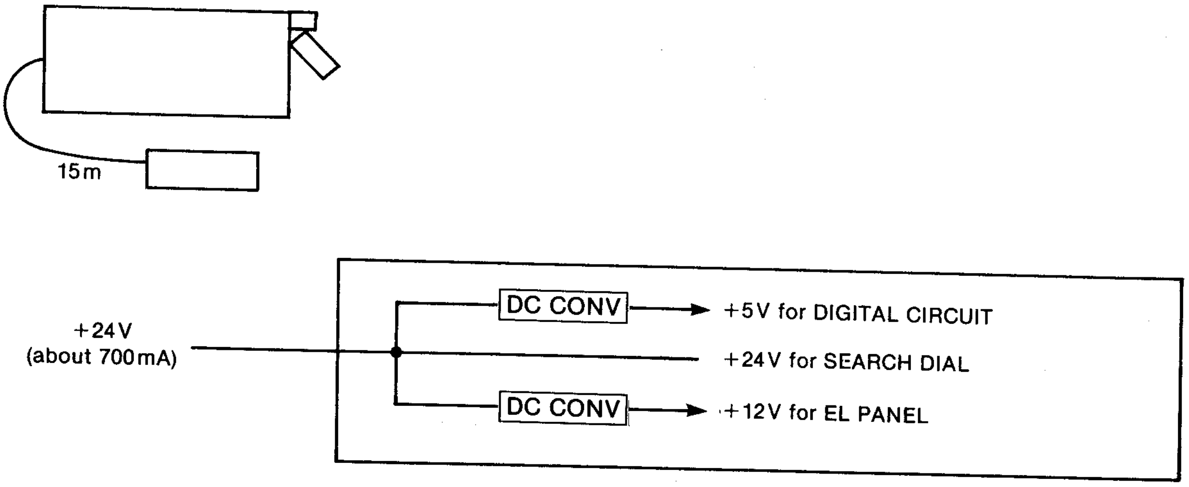

TC ⑧
⑧ DRUM
⑧ CAPSTAN
⑧ REEL
⑧ AT
RS-422
RS-232C
GP-IB
COMMUNICATION MICROCOMPUTER HD64180 ⑧
SYSTEM CONTROL 8 bit CPU HD64180 ⑧
MECHANISM
SEARCH DIAL
RF
FRONT ⑯ 16 bit CPU (EL PANEL GRAPHIC) 68000
AV MICRO -COMPUTER NEC 78010 ⑧
VIDEO
AUDIO
EL PANEL
KEY SCAN
AV CONTROLLER
⑧ : 8 bit CPU
⑯ : 16 bit CPU

Fig. 41 System Control and Front Panel Overall Block Diagram

12-1. FRONT PANEL

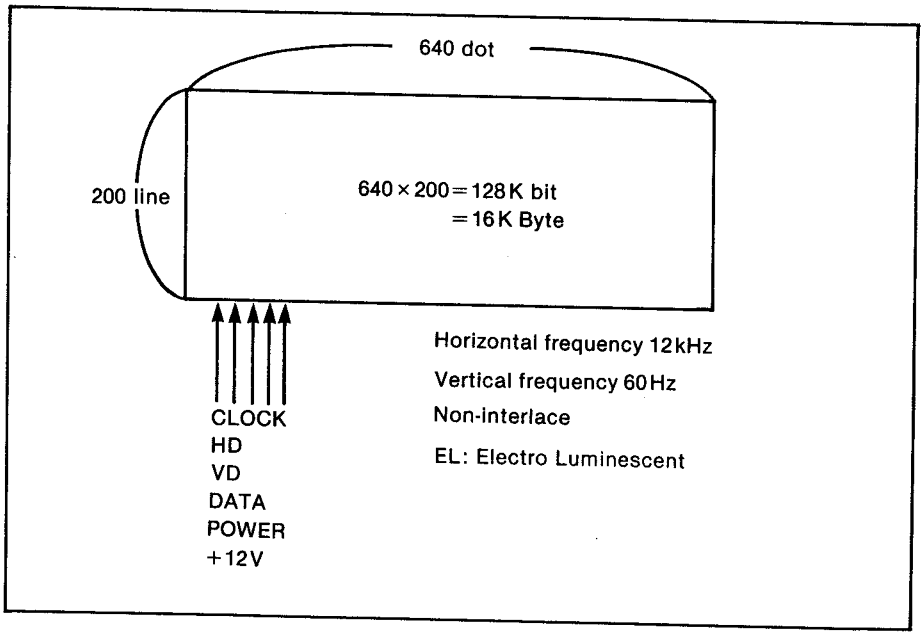
The front panel of the AJ-D350 is tiltable. It can be separated from the machine and used as a remote controller via a 15m cable, through which it also derives a 24V supply. It can also be connected to either the front or rear of the machine (selected by a switch on the front panel).

The CPU used is a 16 bit (68000) processor.
The front panel uses an EL panel (Electro-luminescent panel). It is self illuminating and is more visible than backlighting varieties when used in direct sunlight.



15m
+24V
(about 700mA)
DC CONV
+5V for DIGITAL CIRCUIT
+24V for SEARCH DIAL
DC CONV
+12V for EL PANEL

Fig. 42 Front Panel



640 dot
200 line
640×200=128K bit
=16K Byte
CLOCK
HD
VD
DATA
POWER
+12V
Horizontal frequency 12kHz
Vertical frequency 60Hz
Non-interlace
EL: Electro Luminescent

Fig. 43 Front Panel Display

AJ-D350 Front Block Diagram

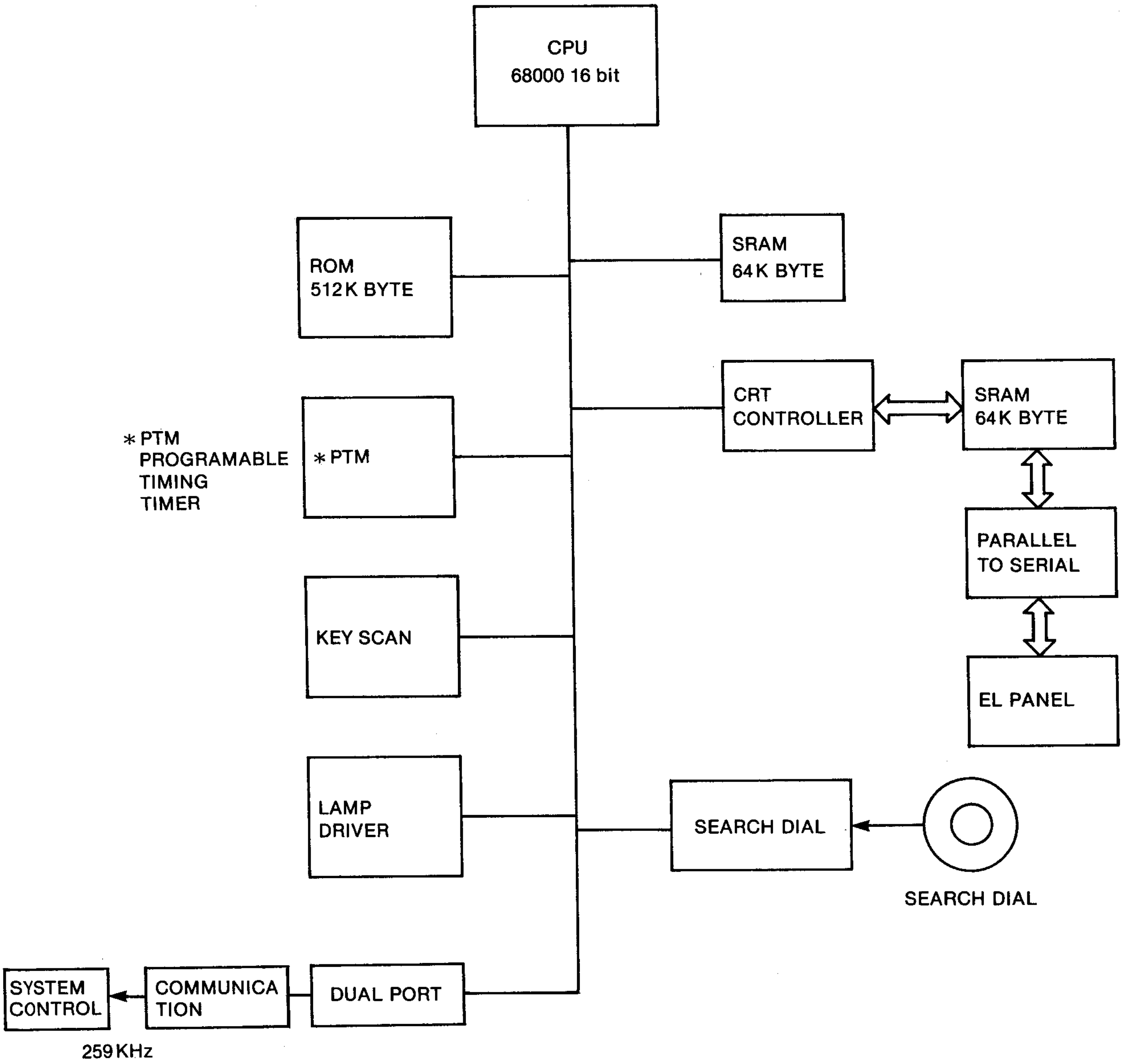

CPU
68000 16 bit
ROM
512K BYTE
SRAM
64K BYTE
CRT
CONTROLLER
SRAM
64K BYTE
*PTM
PROGRAMABLE
TIMING
TIMER
*PTM
PARALLEL
TO SERIAL
KEY SCAN
EL PANEL
LAMP
DRIVER
SEARCH DIAL
SEARCH DIAL
SYSTEM
CONTROL
COMMUNICA
TION
DUAL PORT
259KHz

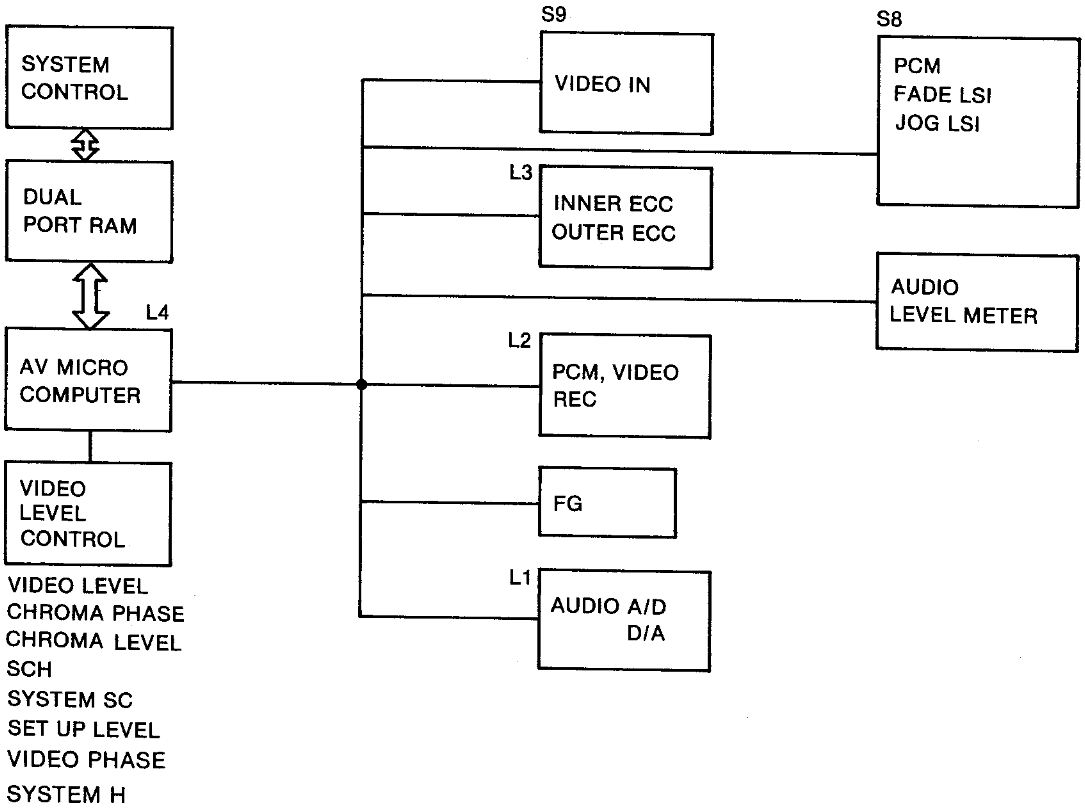
Fig. 44 Front Block Diagram

12-2. V/A Microcomputer (Video/Audio Microcomputer)

The functions of the V/A Microcomputer are:
Self Diagnostic
Electronics VR
Connection for the V/A controller.

Self Diagnostic function
The self diagnostic function is performed by pressing the test key on the front panel.
The V/A Microcomputer stores the test signal in ROM and compares the output data from the main block with the stored data. if they are different, error information is displayed on the front panel.

Electronics VR
The preset values of the Audio and Video are stored in the Electronics VR Memory.
The presetable levels are Video and Audio IN/OUT level, Chroma Phase, Chroma level, SCH and System SCH, etc.

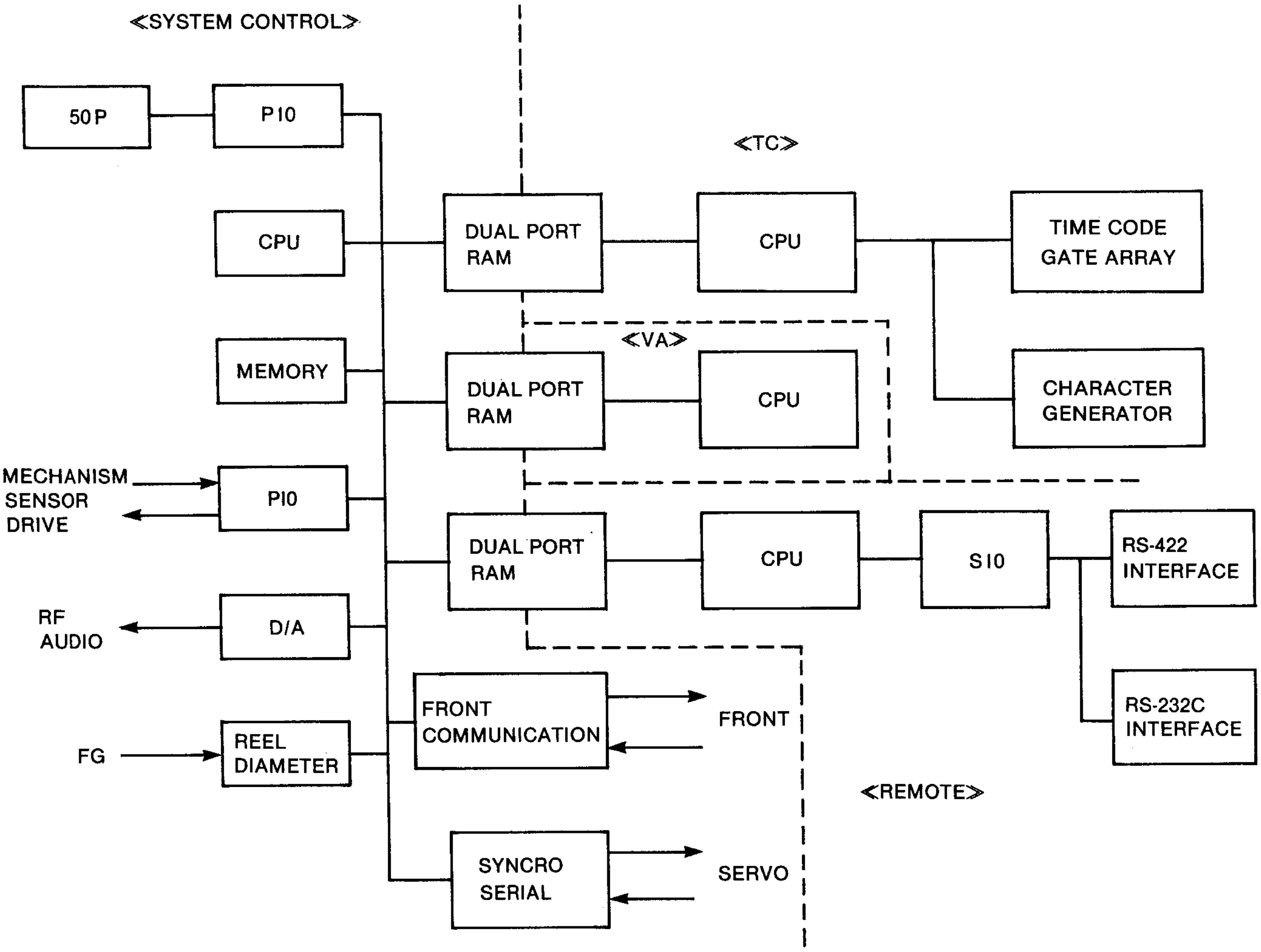


SYSTEM CONTROL
DUAL PORT RAM
L4
AV MICRO COMPUTER
VIDEO LEVEL CONTROL
VIDEO LEVEL
CHROMA PHASE
CHROMA LEVEL
SCH
SYSTEM SC
SET UP LEVEL
VIDEO PHASE
SYSTEM H
S9
VIDEO IN
L3
INNER ECC
OUTER ECC
L2
PCM, VIDEO REC
FG
L1
AUDIO A/D D/A
S8
PCM
FADE LSI
JOG LSI
AUDIO LEVEL METER

Fig. 45 V/A Microcomputer

12-3. SYSTEM CONTROL

The memory of the system control circuit uses Dual Port RAM which can be connected to 2 CPUs simultaneously.
The 8Kbyte memory is used to store the switch settings, this incorporates a backup battery with a life of more than 10 years. The D/A converter is used to control RF current.
Other functions of the system control circuit are: reel diameter calculation, communication with front panel, servo, time code, remote CPU, V/A CPU.



<SYSTEM CONTROL>
50P
P10
CPU
MEMORY
MECHANISM SENSOR DRIVE
PIO
RF AUDIO
D/A
FG
REEL DIAMETER
DUAL PORT RAM
DUAL PORT RAM
DUAL PORT RAM
FRONT COMMUNICATION
SYNCRO SERIAL
FRONT
SERVO
<TC>
CPU
TIME CODE GATE ARRAY
CHARACTER GENERATOR
<VA>
CPU
CPU
S10
RS-422 INTERFACE
RS-232C INTERFACE
<REMOTE>

Fig. 46 System Control Block Diagram

13. Servo circuit

The servo circuit is divided into four control circuits : drum, capstan, reel and AT.

(1) Drum
NTSC 5400/1.001 rpm PAL 6000 rpm
(2) ±100x normal speed search
(3)Noiseless playback at -1 to +3x normal speed by the AT function
(4)Program play function: ±15%, 0.1% step
(expands the time compression through the use of external equipment.)
(5)Correction of the drum's relative speed
The drum speed and the central frequency of the RF PLL are changed.
(6)Identification of the track and the CF by the CTL duty
(7) Tape Speed Override function: ±15%, 1% step

13-1. Drum servo

Designed to control the software, an MN6750 used in its microcomputer.

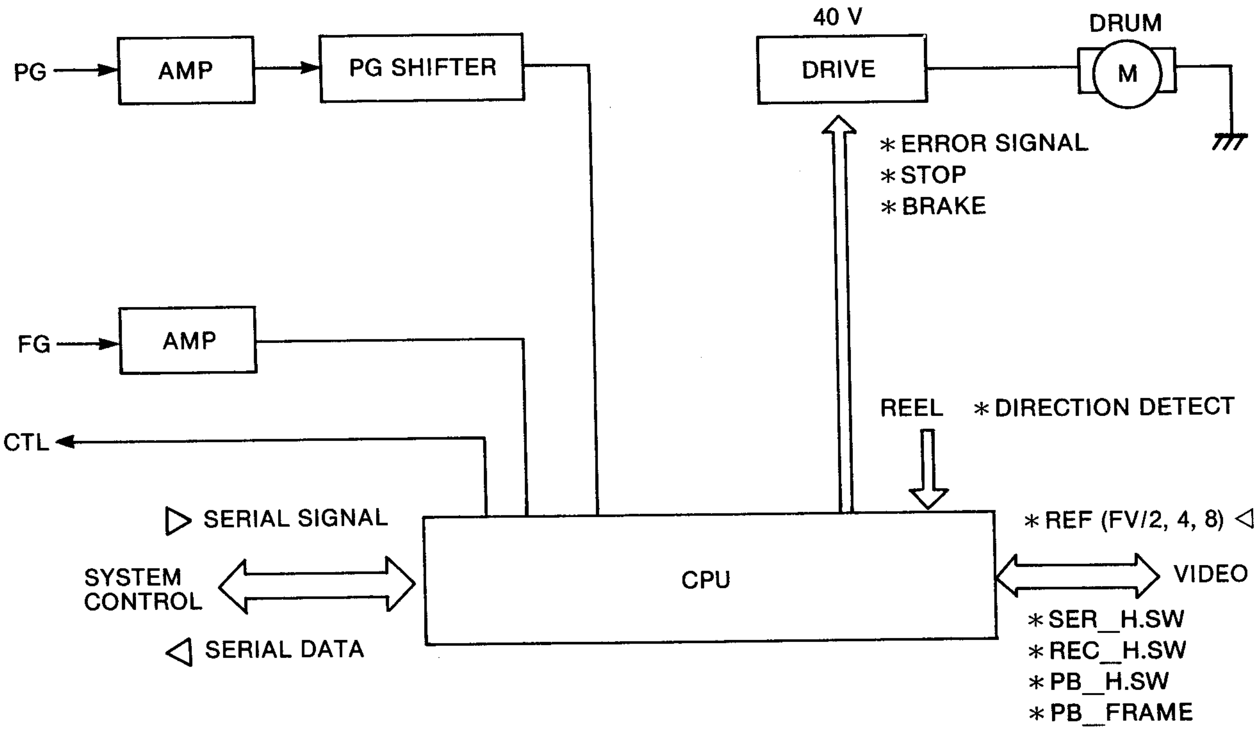

PG
AMP
PG SHIFTER
40 V
DRIVE
DRUM
M
*ERROR SIGNAL
*STOP
*BRAKE
FG
AMP
REEL
*DIRECTION DETECT
CTL
▷ SERIAL SIGNAL
SYSTEM CONTROL
◁ SERIAL DATA
CPU
*REF (FV/2, 4, 8) ◁
VIDEO
*SER_H.SW
*REC_H.SW
*PB_H.SW
*PB_FRAME

Fig. 47 Drum Servo Block Diagram

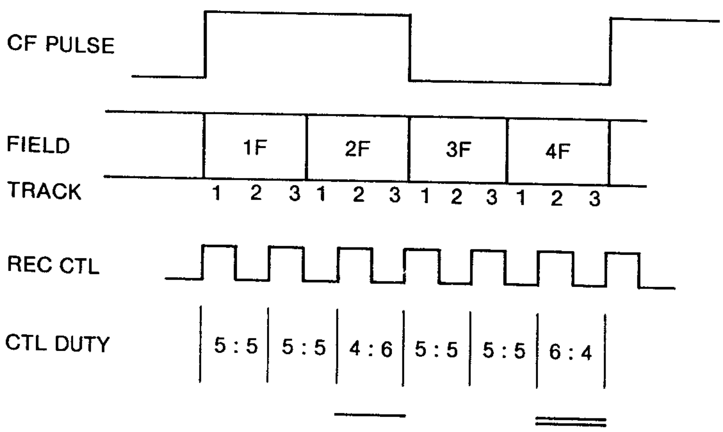
(1) Drum speed control
Data on the drum speed in each mode is fed from the CPU. The drum FG, used as feedback information on the drum speed, is an error signal which is fed to the drive circuit to control the rotation speed of the drum motor.

(2) Drum phase control
The FV/2 is used for the drum phase control reference signal. A frame pulse generated by the synchronizing pulse generator (L4), the FV/2 is locked with the incoming V and the reference V synchronizing pulses in the record and the playback modes, respectively.
The PG signal, used as the comparison signal, is shifted for mechanical reasons. To correct the shift, the PG shifter is used.
While the phase control is not performed in the SHUTTLE mode (at +/-3x or more normal speed), it is executed in the pitch control mode in accordance with the change in the frequency of the FV/2.

(3) REC CTL signal

The REC CTL signal is generated by the FV/2 which is synchronized with incoming V synchronizing pulse. The REC CTL signal, required in every track, is designated as 100 Hz signal for PAL and 90 Hz signal for NTSC. The CTL duty ratio is divided into 5 : 5, 4 : 6 and 6 : 4 to control the color framing as the case demands.

NTSC REC CTL


CF PULSE
FIELD
1F
2F
3F
4F
TRACK
1 2 3 1 2 3 1 2 3 1 2 3
REC CTL
CTL DUTY
5 : 5
5 : 5
4 : 6
5 : 5
5 : 5
6 : 4

PAL REC CTL

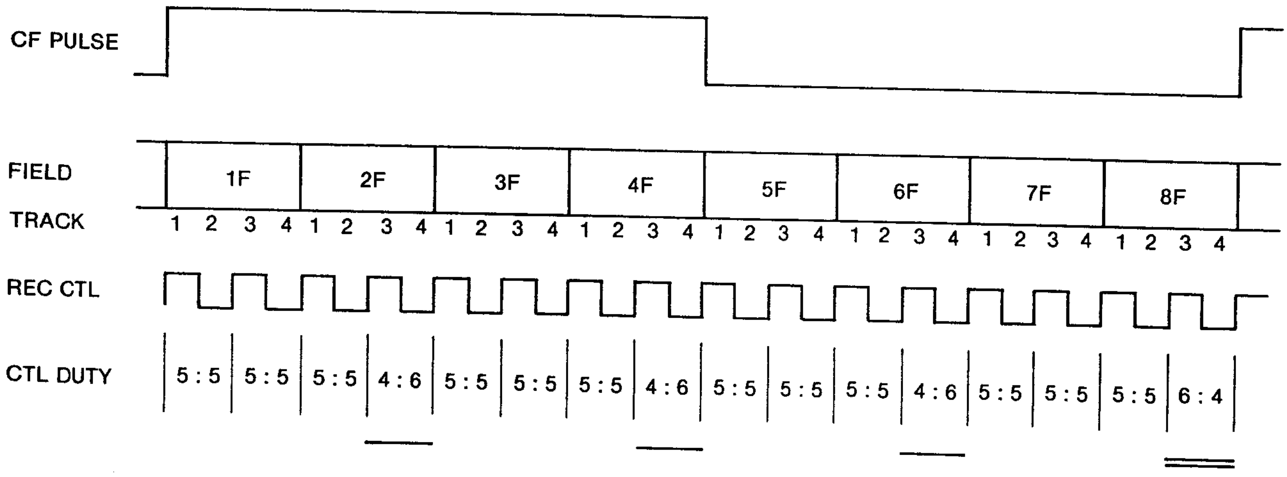

CF PULSE
FIELD
1F
2F
3F
4F
5F
6F
7F
8F
TRACK
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4
REC CTL
CTL DUTY
5 : 5
5 : 5
5 : 5
4 : 6
5 : 5
5 : 5
5 : 5
4 : 6
5 : 5
5 : 5
5 : 5
4 : 6
5 : 5
5 : 5
5 : 5
6 : 4

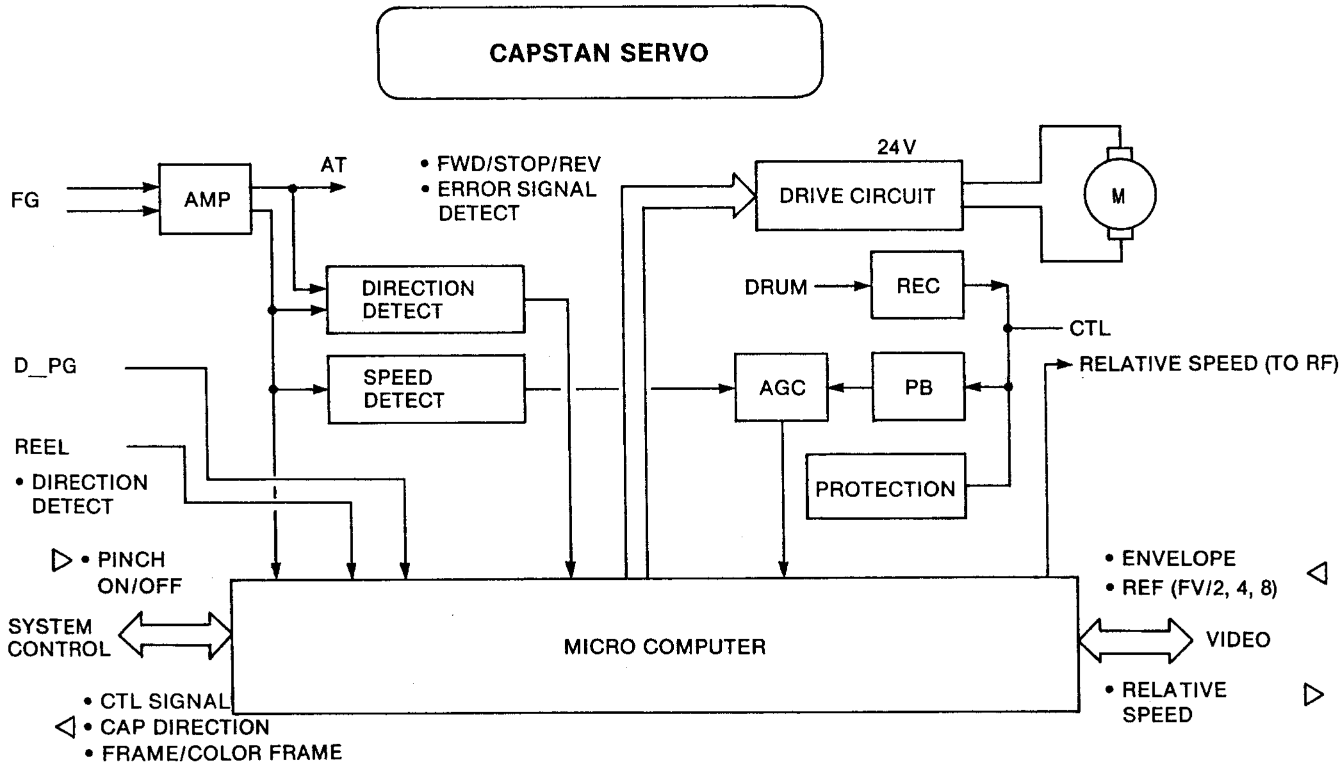
Fig. 48 Recording Control Pulse

(4) Drum FG

	NTSC	**PAL**
(a) FG gear tooth :	24	24
(b) FG frequency :	2160/1.001 Hz	2400 Hz
(c) FG composition :	Pattern Magnet	Pattern Magnet
(d) Drum rotation speed :	5400 rpm/1.001	6000 rpm at PB

13-2. Capstan servo

Similarly to the drum servo, the capstan servo is designed to be controlled by software in its microcomputer.
At speeds below and including three times normal speed, in forward, and in reverse, the pinch roller is in contact with the tape.



CAPSTAN SERVO
FG
AMP
AT
• FWD/STOP/REV
• ERROR SIGNAL DETECT
24 V
DRIVE CIRCUIT
M
DIRECTION DETECT
DRUM
REC
CTL
SPEED DETECT
AGC
PB
RELATIVE SPEED (TO RF)
D_PG
REEL
• DIRECTION DETECT
PROTECTION
• PINCH ON/OFF
SYSTEM CONTROL
MICRO COMPUTER
• ENVELOPE
• REF (FV/2, 4, 8)
VIDEO
• RELATIVE SPEED
• CTL SIGNAL
• CAP DIRECTION
• FRAME/COLOR FRAME

Fig. 49 Capstan Servo Block Diagram

(1) Capstan speed control
The capstan speed is controlled by the speed mode data from the system control and the feedback FG from the capstan motor.
This FG also detects the tape-running directions by using two FGs with phases different by 90 degrees.
(2) Capstan FG

	NTSC	PAL	REMARK
(a) Capstan rotation speed :	319.4 rpm	320.4 rpm	at PB
(b) Capstan variable range :	0 ~ 958 rpm	0 ~ 961 rpm	-3x ~ +3x
(c) Number of FG gear tooth :	501 pcs	501 pcs	
(d) FG frequency :	2670/1.001 Hz	2675 Hz	at PB
(e) FG variable range :	0 ~ 8002 Hz	0 ~ 8025 Hz	-3x ~ +3x
(f) FG composition :	MR Head/Magnet	MR Head/Magnet	

(3) Capstan phase control

The reference and the comparison signals for the capstan phase control are described as follows :

Mode	Reference	Comparison	Condition
REC	FV/2	Divided FG	
PB	FV/2,4,8	CTL	
INSERT	FV/2,4,8	CTL	
ASSEMBLE	FV/2,4,8	CTL	PREROLL
ASSEMBLE	FV/2,4,8	Divided FG with CTL reset	Editing

In the pitch control mode, the capstan servo performs the phase control by following the changes in the frequency of the FV/2, FV/4 and FV/8.

The FV/2, (30 Hz for NTSC and 25 Hz for PAL), is not used as the reference signal in the REC mode.
The reference signal used in the PB mode differs depending on the color framing modes : the FV/2 (30 Hz for NTSC, 25 Hz for PAL) is used in the 2F (2 field) mode, the FV/4 (15 Hz for NTSC, 12.5 Hz for PAL) in the 4F mode, and the FV/8 (none for NTSC, 6.25 Hz for PAL) in the 8F mode.
These different reference signals used in the PB mode above are also used in the insert mode depending on the color framing modes.
The assemble editing mode, held in the PB mode during the prerolling period, is turned into the REC mode when editing starts. However, the assemble editing mode's comparison signal used in the PB mode is different from that in the REC mode : the former is CTL signal and the latter divided FG. Therefore these different comparison signals are kept synchronized by resetting the divided FG to the CTL signal during the prerolling period.

13-3. Reel servo

The functions and features of the reel motor control are as follows :

(1) Torque control by DC
    When loading/unloading a tape
(2) Tension control of tape tension
    When the pinch roller is working
(3) Tape speed and tension control
    When FF/REW/SHTL speed
(4) Tape remaining calculation without timer roller
(5) Control of take-up reel without take-up side tension sensor

(1) When a tape is being loaded or unloaded, the torque of the reel motor is controlled by DC to prevent the tape tension from being too low or too high.

(2) In the normal and variable PB modes in which the pinch roller is applied, the tape speed and running direction are controlled by the capstan motor. At this time tension control is performed by the reels.
The tension data sent from the tape is detected by the tension pick-up to control the supply reel motor. The tension of the take-up reel is controlled by calculating the tape roll diameter, which is an open-loop control system.
For this control, the capstan accel compensation torque and tape diameter detection torque are used.

(3) The pinch roller is applied at -3 to +3x normal speed. In search mode beyond that speed, the take-up reel controls the tape speed, and the supply reel the tension.
For example, in the FF mode the take-up reel executes the tape speed control and the supply reel the tension control. In the REW mode, the tape speed is controlled by the supply reel and the tension by the take-up reel.

(4) Elimination of timer roller
The timer roller used in the MII was designed to feed the tape speed data to the system controller at all times by directly contacting with the tape. The system controller worked to indicate the tape remaining and to switch the torque of each reel by calculating the tape roll diameter through the analysis of the tape speed data FG and of the reel FG.
The timer roller, used so far to calculate the roll diameter of the take-up and supply reels,has now been abolished to improve the accuracy of the speed and the tension controls by getting rid of the calculation errors caused by the timer roller's slippage or deterioration with age. The abolition of the timer roller in this design has also helped simplify the mechanism of the reel servo.

REEL SERVO

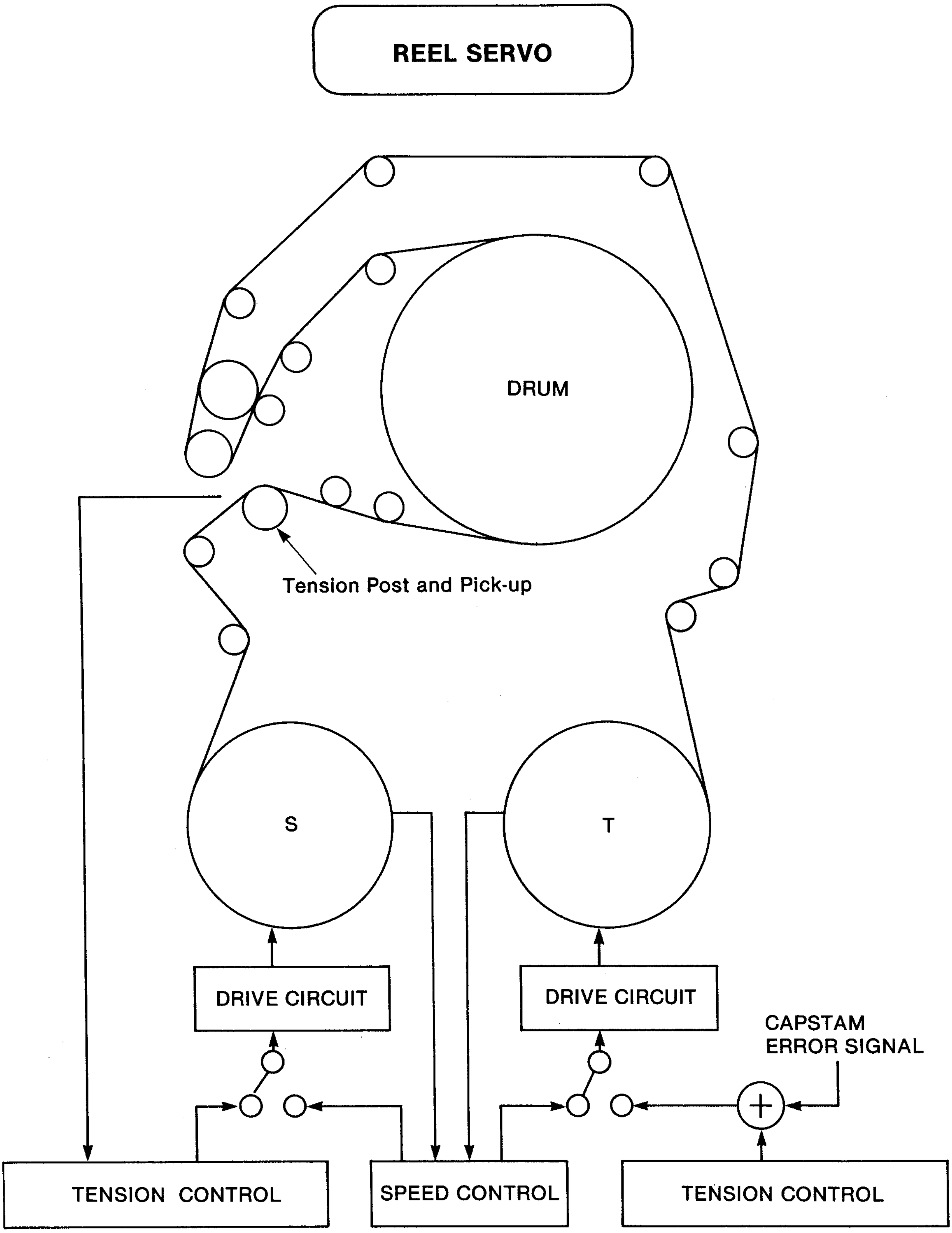

REEL SERVO
DRUM
Tension Post and Pick-up
S
T
DRIVE CIRCUIT
DRIVE CIRCUIT
CAPSTAM
ERROR SIGNAL
TENSION CONTROL
SPEED CONTROL
TENSION CONTROL

Fig. 50 Reel Servo Block Diagram

14. Auto Tracking Circuit

The main characteristics of the Auto Tracking Circuit are shown below.

1. Variable Playback
    - -1x through +3x (Field Playback)
    - 0x through +2x (Field or Frame Playback selectable by menu)
2. JOG
    - -1x through +3x
3. Strain Gauge control
4. Maximum Envelope control
5. Track angle following control

14-1. AT Head Assignment

The angle between AT and REC heads is 90 degrees.
The operation of the AT heads is different when used in normal playback and confidence playback modes.

During normal playback, the AT heads are one frame (PAL eight tracks, NTSC six tracks) and 90 degrees advanced - AT head A plays the track recorded by REC head A, and AT head B plays the track recorded by REC head B.

During confidence playback the AT heads are delayed 90 degrees with respect to the REC heads, and AT head A plays the track recorded by REC head B and AT head B plays the track recorded by REC head A.

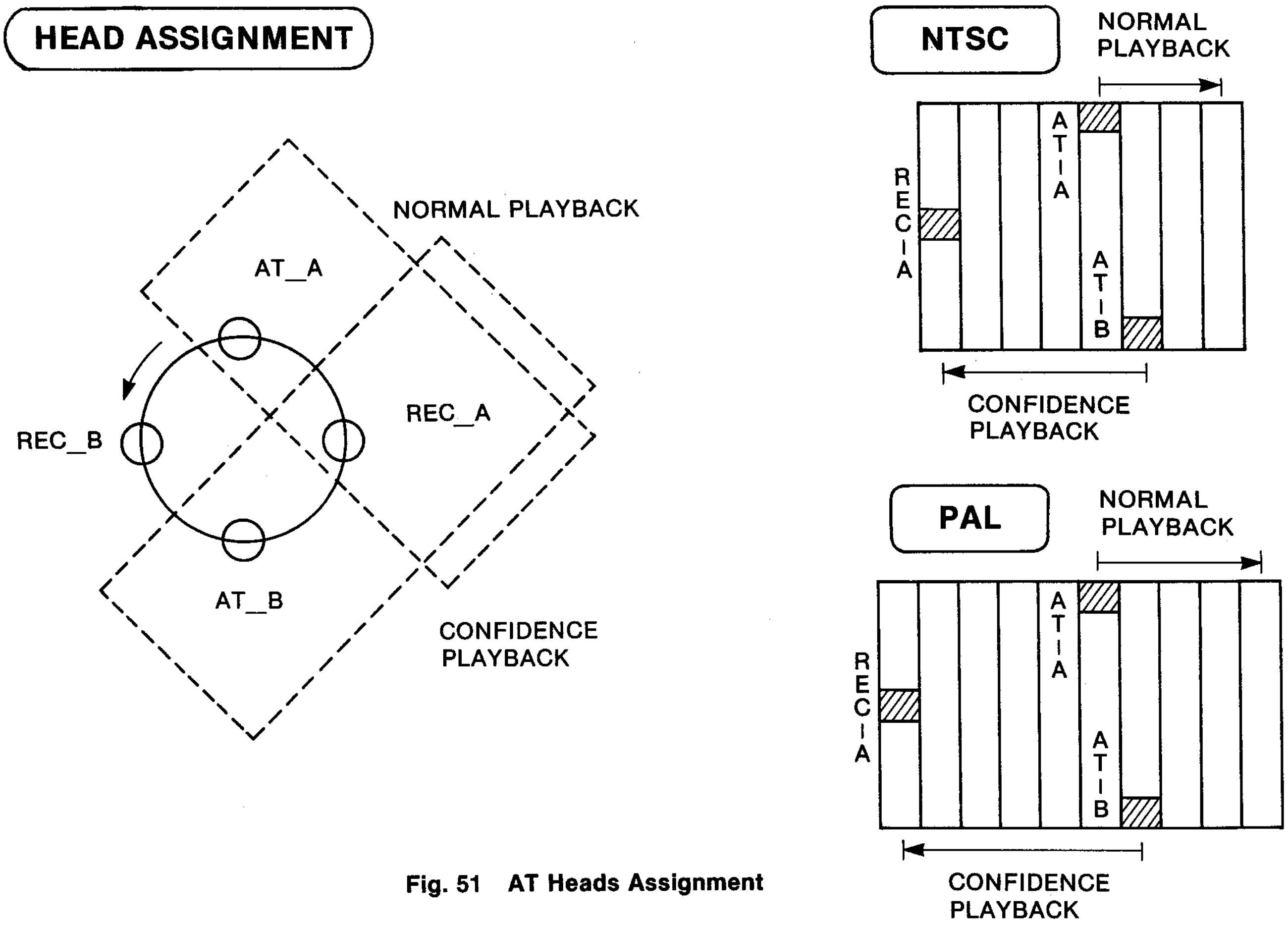

HEAD ASSIGNMENT
NORMAL PLAYBACK
AT_A
REC_B
REC_A
AT_B
CONFIDENCE PLAYBACK
NTSC
NORMAL PLAYBACK
REC A
AT A
AT B
CONFIDENCE PLAYBACK
PAL
NORMAL PLAYBACK
REC A
AT A
AT B
CONFIDENCE PLAYBACK

Fig. 51 AT Heads Assignment

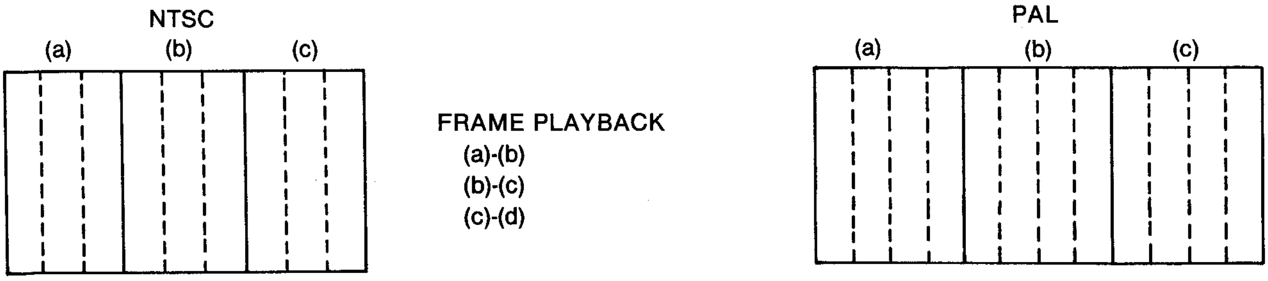

NTSC
(a)
(b)
(c)
FRAME PLAYBACK
(a)-(b)
(b)-(c)
(c)-(d)
PAL
(a)
(b)
(c)

Fig. 52 Frame Playback

14-2. AT Head Drive Counter

To enable the AT head to follow the track accurately in variable playback mode, it must be supplied with the correct voltage. The Drive Counters (two for each head; A and B) calculate this voltage.

One volt moves the AT head 1 µm (maximum voltage +/- 450 volts).

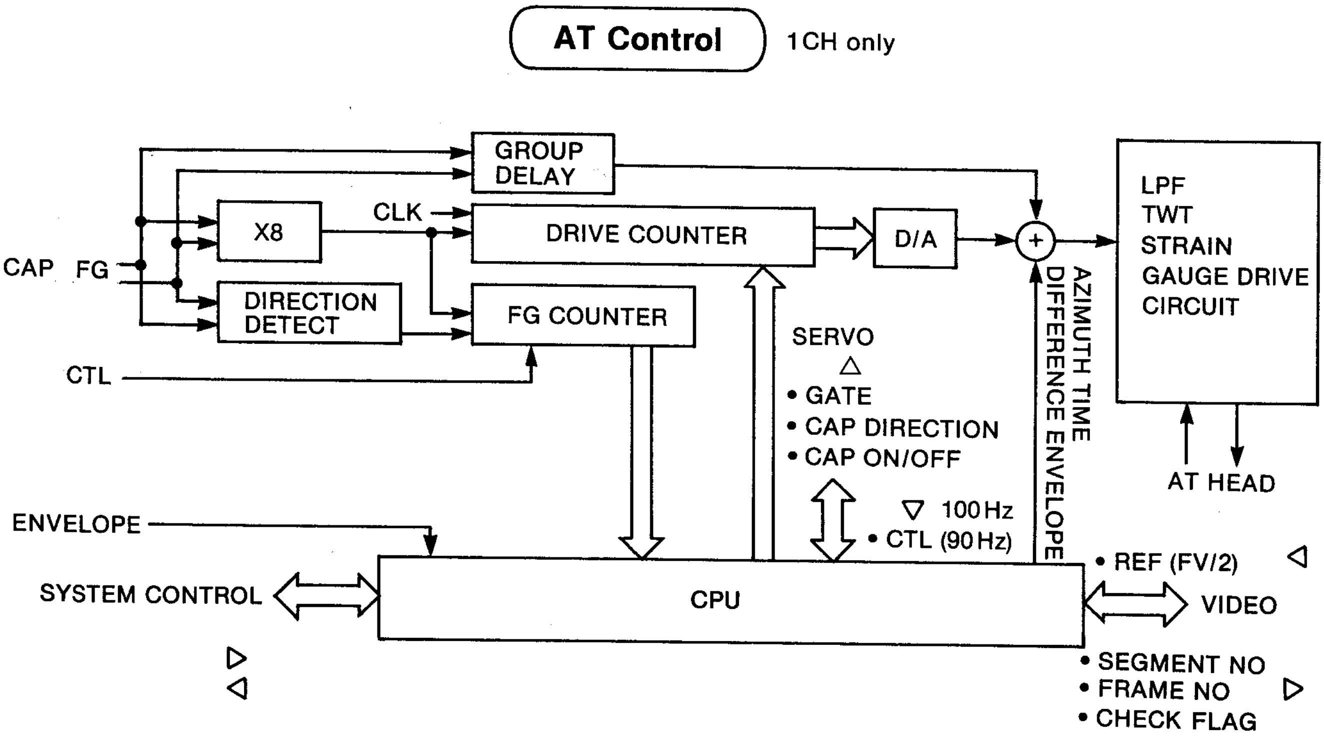

AT Control
1CH only
GROUP DELAY
X8
CLK
DRIVE COUNTER
D/A
+
LPF
TWT
STRAIN
GAUGE DRIVE
CIRCUIT
CAP FG
DIRECTION DETECT
FG COUNTER
CTL
SERVO
△
• GATE
• CAP DIRECTION
• CAP ON/OFF
▽ 100Hz
• CTL (90Hz)
AZIMUTH TIME
DIFFERENCE ENVELOPE
AT HEAD
ENVELOPE
SYSTEM CONTROL
CPU
• REF (FV/2)
◁
VIDEO
▷
◁
• SEGMENT NO
• FRAME NO
• CHECK FLAG
▷

Fig. 53 Auto Tracking Block Diagram

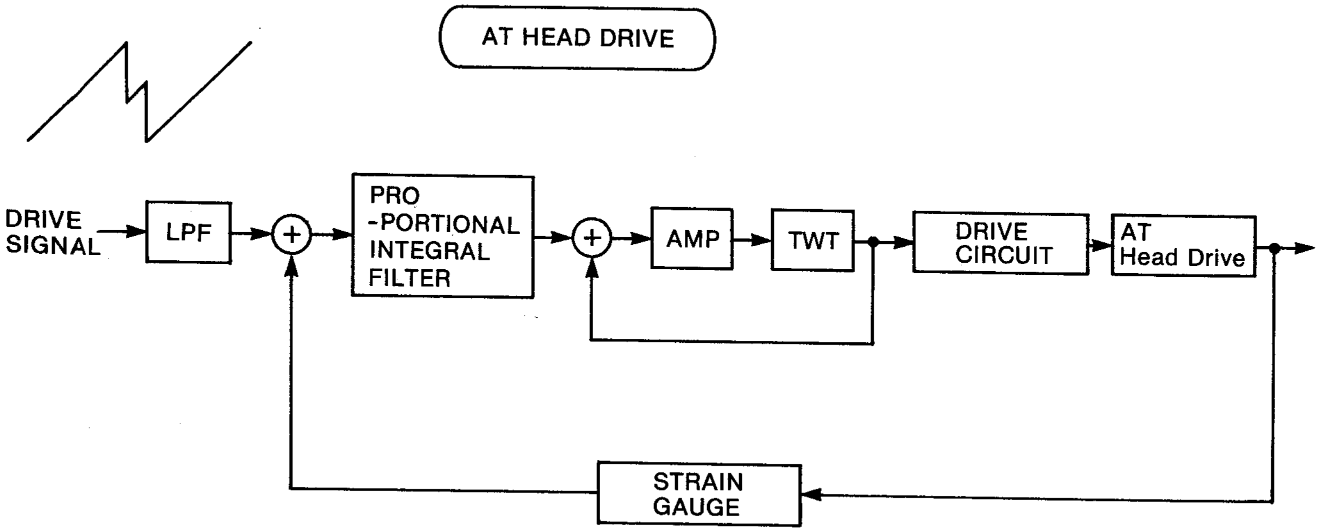

AT HEAD DRIVE
DRIVE SIGNAL
LPF
+
PRO -PORTIONAL INTEGRAL FILTER
+
AMP
TWT
DRIVE CIRCUIT
AT Head Drive
STRAIN GAUGE

Fig. 54 AT Head Drive Circuit

3 X Playback

3× Playback

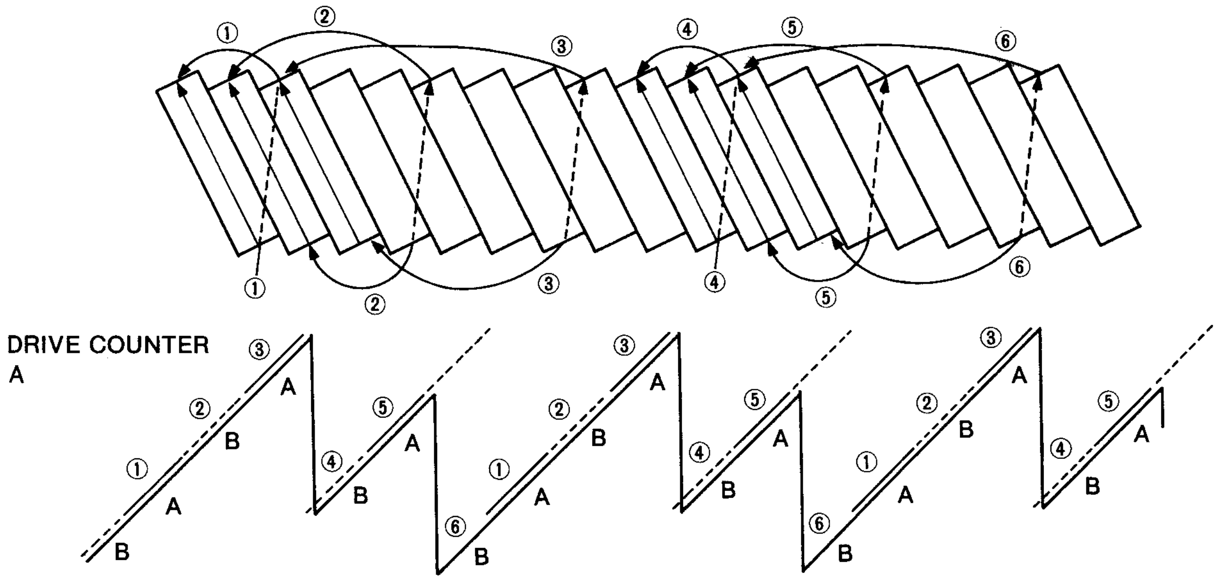

①
②
③
④
⑤
⑥
DRIVE COUNTER
A
A
B

Fig. 55 Drive Counter Waveform

1.3× Playback

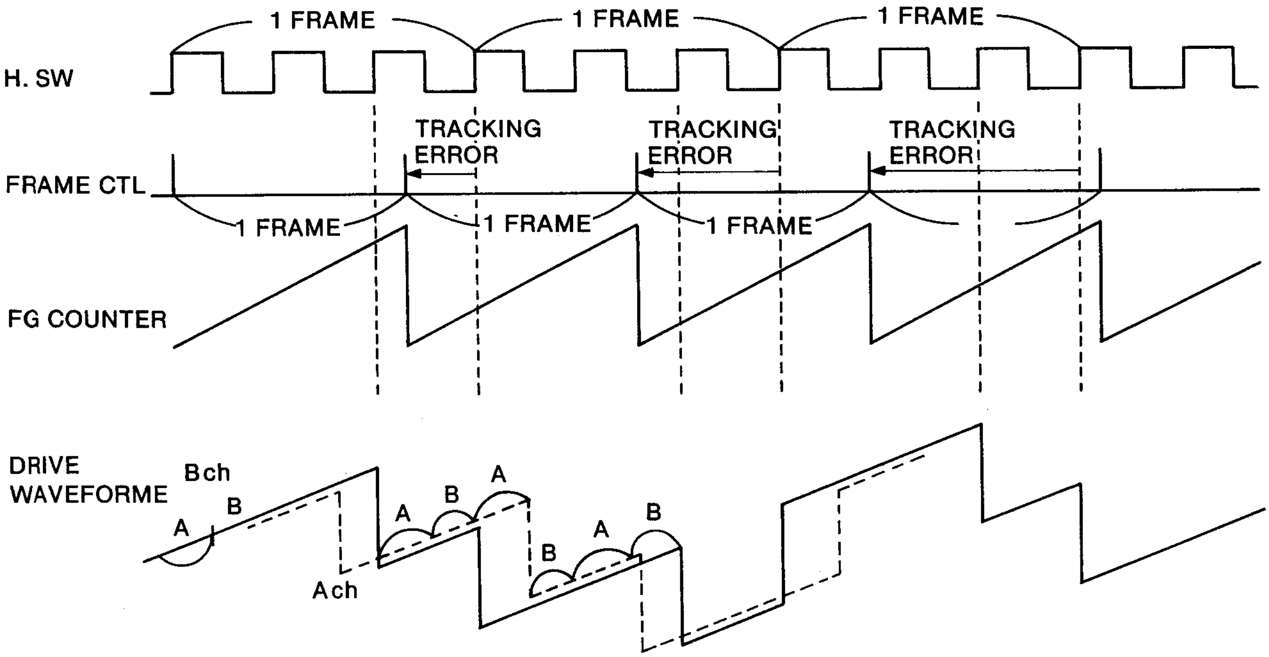

1 FRAME
H. SW
TRACKING ERROR
FRAME CTL
FG COUNTER
DRIVE WAVEFORME
Bch
Ach
A
B

Fig. 56 FG Counter and Drive Waveform

14-3. Tracking Pattern Generator

The basic AT head movement is decided by the Tracking pattern generator and it is consist of the Drive counter and FG counter.
The Drive counter determines the trace angle, and the FG circuit determines the tracking start offset.
The Drive counter starts its count on the frame control pulse (CTL) and is reset by the next frame control pulse. The FG counter counts the capstan FG and displays the actual tape speed. The frame CTL is the start pulse of each frame and is produced from normal CTL.
During one frame, the number of FG is same but the duration of the frame is different, therefore the FG counters slope angle is different. The following figure shows the FG counters slope angle in 1/2x, 1x and 2x playback speed.
The output of the FG counter is subtracted from the internal clock count to produce the drive counter output.
The internal clock counter always counts the same number as the FG at normal playback speed, therefore the slope angle of the drive counter drive counter during playback is zero degrees.
The tracking error is calculated using the phase difference between the frame CTL and the frame start of the head switching.
The FG counter starts count at the CTL pulse and stops count at next CTL pulse, and the FG counter makes sawtooth waveform.
This waveform is sampled and held by Head swithing pulse.
The sample and hold count number shows the tracking error, and the number is sent to the drive counter as preset value to make offset.

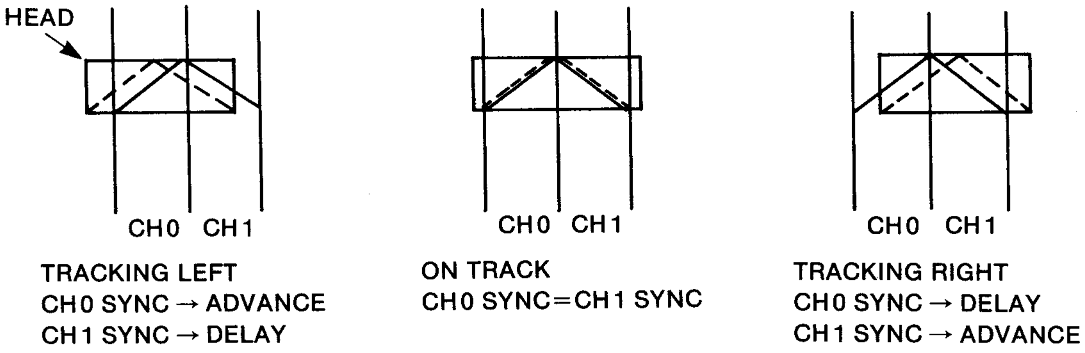
14-4. Auto Tracking Block Diagram

The Auto Tracking Circuit consists of the following :

(1) CPU
The CPU incorporates the A/D and D/A converters. The CPU communicates with the system control circuit, and produces the AT control signals.

(2) Drive Counter
The Drive Counter sends the track angle and tracking error information to the CPU. The drive counter also controls AT head movement.

(3) Azimuth Time Difference Circuit
Tracks CH0 and CH 1 both have a 20 degree azimuth angle but they are offset with respect to one another.
If the tracking is adjusted to the left, the CH0 sync timing is delayed behind CH1 sync. If the tracking is adjusted to the right, CH0 sync timing is advanced in relation to CH1 sync. To control the movement of the AT heads in order that CH0 and CH1 sync timing is zero, tracking is performed correctly throughout the track.



TRACKING LEFT
CH0 SYNC → ADVANCE
CH1 SYNC → DELAY

ON TRACK
CH0 SYNC=CH1 SYNC

TRACKING RIGHT
CH0 SYNC → DELAY
CH1 SYNC → ADVANCE

Fig. 57 Azimuth Time Differenece

(4) Group Delay, LPF, TWT.
The Group Delay circuit compensates the frequency characteristic of the AT head drive signal.
LPF : Smooths the drive waveform.
TWT (Twin-T filter) eliminates the 540Hz mechanical resonance frequency from the AT drive signal and thereby prevents head damage.

14-5. Strain Gauge Control

This circuit ensures that the AT head movement is linear by compensating for non-linearity.

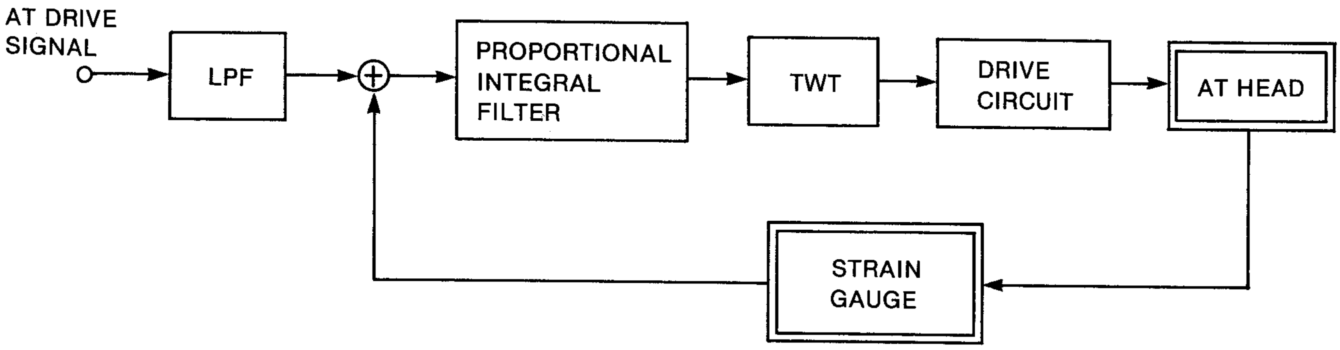

AT DRIVE SIGNAL
LPF
PROPORTIONAL INTEGRAL FILTER
TWT
DRIVE CIRCUIT
AT HEAD
STRAIN GAUGE

Fig. 58 Strain Gauge Control

15. Diagnostics Overview

The Aims of the Diagnostic System

1. To assist the operator during normal operations.
   (Alarm displays and Help function)

2. To Identify the cause of system errors-faults, operator error.

3. To Inform the maintenance staff of the action necessary to rectify errors.

4. To implement remote self diagnostics enabling communication of system status to a service headquarters.

Diagnostic Function

The diagnostic function automatically monitors the system status, displays when errors occur and guides the user into how the error may be overcome.

The system can distinguish
-Operator Error,
-Circuit Error,
-Mechanism Error
-Communication Error.

15-1. Setup Functions

The setup function allows the VTR settings to be stored in memory. The set-up files include operational set-up details such as tracking, record current, audio and video signal levels. A factory default set-up file is provided as is a configurable standard user file. The set-up files are loaded to become the current VTR setting.

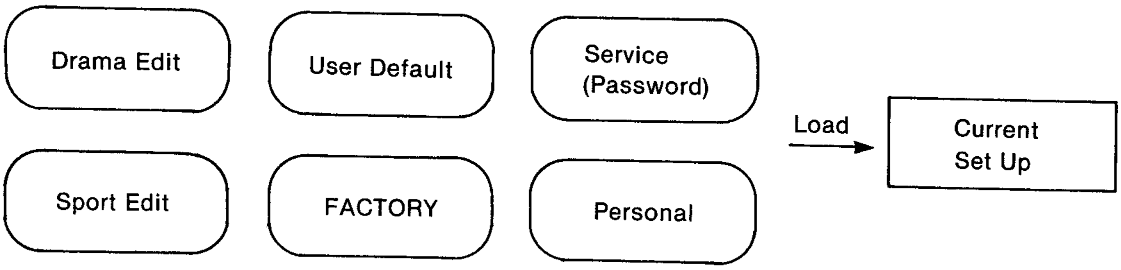

Drama Edit
User Default
Service (Password)
Sport Edit
FACTORY
Personal
Load
Current Set Up

Fig. 59 User Files

15-2. Communication Function

The communication system will allow service engineers to interrogate the status of the VTR from a remote location. The basic concept is that all the self diagnostics will be able to be remotely controlled. Software will be developed allowing the diagnostics to be controlled from a (laptop) PC.

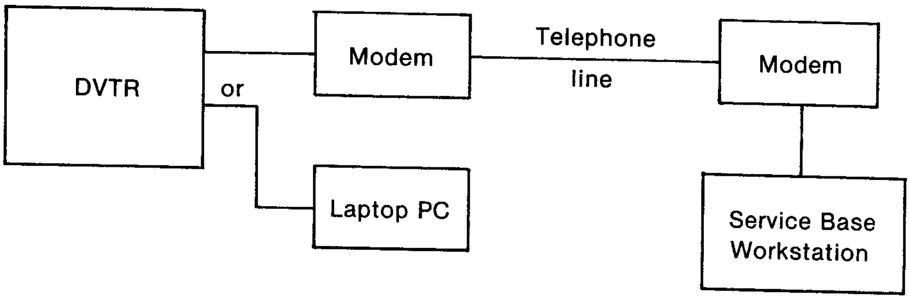

DVTR
or
Modem
Telephone line
Modem
Laptop PC
Service Base Workstation

Fig. 60 PC Communication

The communication system will allow the complexities of the self diagnostics to be hidden from the VTR user. To implement complete control of the self diagnostics from the VTR would need many complex menus and place a large demand upon the system resources. Controlling the system from a PC will allow more sophisticated control of the diagnostic system. The software developed for the PC will allow:

-Detailed control of the diagnostic system
-Loglist maintenance
-Error rate monitoring
-VTR control
-User data set up

15-3. Error Rate Measurement

*1 Flag count from inner decoder-counts number of errors after inner correction

*2 Flag count from outer decoder-counts number of uncorrectale errors

*3 Compare input and output in record-counts number of different samples

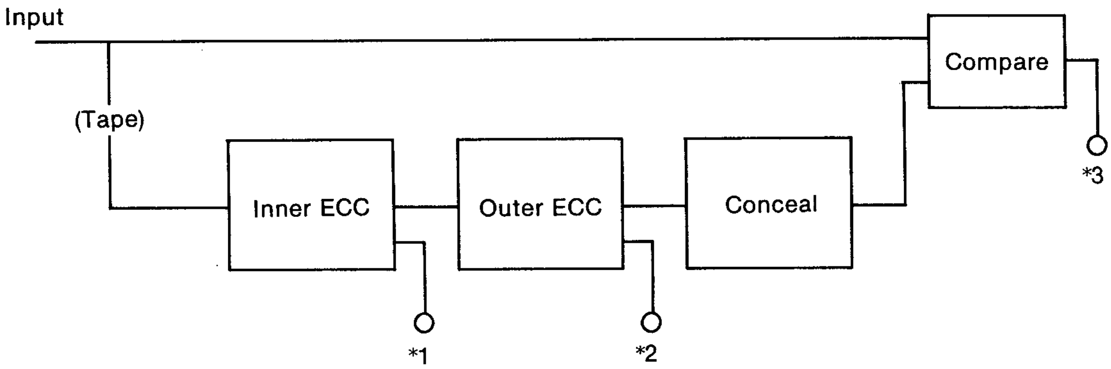


Fig. 61 Error Rate Check

15-4. Logfile

A user threshold can be set for all the error rate measurement methods. If the threshold is exceeded details are recorded in the LOGFILE. Recorded with the error information are the relevant:

-Time code value
-Field (even/odd)
-Head details

15-5. Monitoring

There are three stages of error indication on the VTR front panel.

Stage 1 : No errors over user set threshold value

Stage 2 : Small number of errors over threshold value

Stage 3 : Large number of errors over threshold value Action is required.

15-6. Video Test Screen

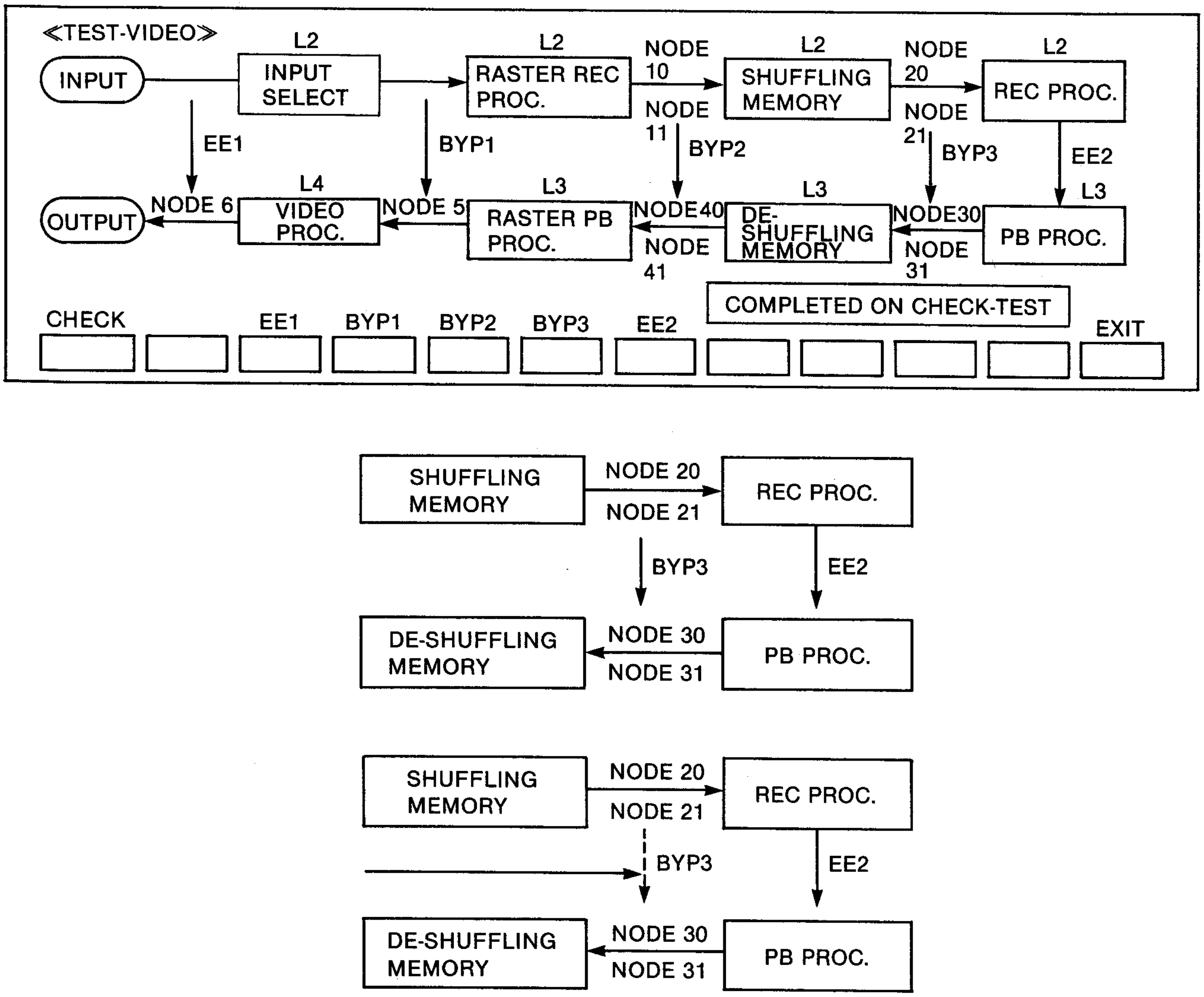
TEST FUNCTIONS

1) CHECK TEST : compare video signal data, which are continuously input and processed in each block, and judge the quality of the data in 10 frames.
2) BY PASS TEST : by pass signals of each block so that abnormal points can be found on the monitor screen to make the judgements.

OPERATIONS

1) CHECK TEST : * When pressing F1 (CHECK) button, function part flashes in rapid cycle. (Approximately 100 m SEC is required to obtain results)

*When the result is figured out, corresponding mode number flushes.
*flushing continues until when BY PASS TEST is selected, when the CHECK TEST is selected, or when this mode is released by selecting exit.



≪TEST-VIDEO≫
INPUT
L2
INPUT SELECT
L2
RASTER REC PROC.
NODE 10
NODE 11
L2
SHUFFLING MEMORY
NODE 20
NODE 21
L2
REC PROC.
EE1
BYP1
BYP2
BYP3
EE2
OUTPUT
NODE 6
L4
VIDEO PROC.
NODE 5
L3
RASTER PB PROC.
NODE40
NODE 41
L3
DE-SHUFFLING MEMORY
NODE30
NODE 31
L3
PB PROC.
COMPLETED ON CHECK-TEST
CHECK
EE1
BYP1
BYP2
BYP3
EE2
EXIT
SHUFFLING MEMORY
NODE 20
NODE 21
REC PROC.
BYP3
EE2
DE-SHUFFLING MEMORY
NODE 30
NODE 31
PB PROC.
SHUFFLING MEMORY
NODE 20
NODE 21
REC PROC.
BYP3
EE2
DE-SHUFFLING MEMORY
NODE 30
NODE 31
PB PROC.

Fig. 62 Video Test Menu

Service Manual

Maintenance Procedures
Mechanical Adjustments

Panasonic
Broadcast Systems

MAINTENANCE AND MECHANICAL ADJUSTMENT PROCEDURES

CONTENTS

1. AJ-D350 MAINTENANCE PARTS CHART AND PARTS LOCATION 2-1
SERVICE FIXTURES & TOOLS 2-2

2. DISASSEMBLY PROCEDURES 2-5
2-1. TOP PANEL REMOVAL 2-5
2-2. BOTTOM PANEL REMOVAL 2-5
2-3. FRONT LOADING (CARRIAGE UNIT) REMOVAL 2-5
2-4. L1, L2, L3, L4 P.C. BOARD SHIELD PLATE REMOVAL 2-6
2-5. POWER BOX REMOVAL 2-7

3. AJ-D350 MANUAL TAPE EJECT 2-8

4. RECOMMENDED CLEANING AND CONFIRMATION PROCEDURES 2-9
4-1. MATERIALS REQUIRED 2-9
4-2. RECOMMENDED SCHEDULE 2-9
4-3. CLEANING PROCEDURES 2-10
4-4. LUBRICATION OF THE GEARS AND SLIDING SURFACES 2-14

5. MAIN MECHANISM ADJUSTMENT PROCEDURES 2-17
5-1. TAPE TRANSPORTATION POSTS NAME 2-17
5-2. TENTELO METER CALIBRATION 2-18
5-3. SENSOR AMP OFFSET ADJUSTMENT 2-19
5-4. SUPPLY SENSOR TENSION ADJUSTMENT 2-20
5-5. TAKE UP REEL TORQUE ADJUSTMENT 2-21
5-6. SUPPLY REEL TORQUE ADJUSTMENT 2-22
5-7. LOADING TORQUE ADJUSTMENT 2-23
5-8. SUPPLY (FWD.) TENSION ADJUSTMENT 2-23
TAPE TRANSPORTATION POSTS LIMIT POSITION TABLE 2-24
POST HEIGHT PRE-ADJUSTMENT (FACTORY ADJUSTMENT) 2-25
MICRO METER SETTING 2-26
5-10. P3 POST INCLINED ANGLE ADJUSTMENT (FACTORY ADJUSTMENT ONLY) 2-27
5-11. INCLINED POST ANGLE ADJUSTMENT (FACTORY ADJSUTMENT ONLY) 2-27
5-12. INCLINED POST INCLINED ANGLE ADJUSTMENT 2 (FACTORY ADJUSTMENT ONLY) 2-28
5-13. P3 POST HEIGHT ADJUSTMENT 2-29
5-14. P6 POST HEIGHT ADJUSTMENT 2-30
5-15. P7, P8, P9, P10 AND P11 POST HEIGHT ADJUSTMENT 2-31
5-16. P4, P5 POST HEIGHT ADJUSTMENT 2-32
5-17. A/C HEAD ADJUSTMENT FLOW CHART 2-33
5-17-1. A/C HEAD TILT CONFIRMATION 2-33-1
5-18. A/C HEAD TILT ADJUSTMENT 2-34
5-19. A/C HEAD HEIGHT ADJUSTMENT 2-36
5-20. A/C HEAD AZIMUTH ADJUSTMENT 2-37
5-21. CTL OUTPUT CONFIRMATION 2-38
5-22. A/C HEAD HORIZONTAL POSITION COARSE ADJUSTMENT 2-39

5-23 A/C HEAD HORIZONTAL POSITION FINE ADJUSTMENT 2-40
5-24 FINAL CONFIRMATION OF TRACKING OPTIMIZE 2-41
5-25 PG SHIFTER ADJUSTMENT 2-42

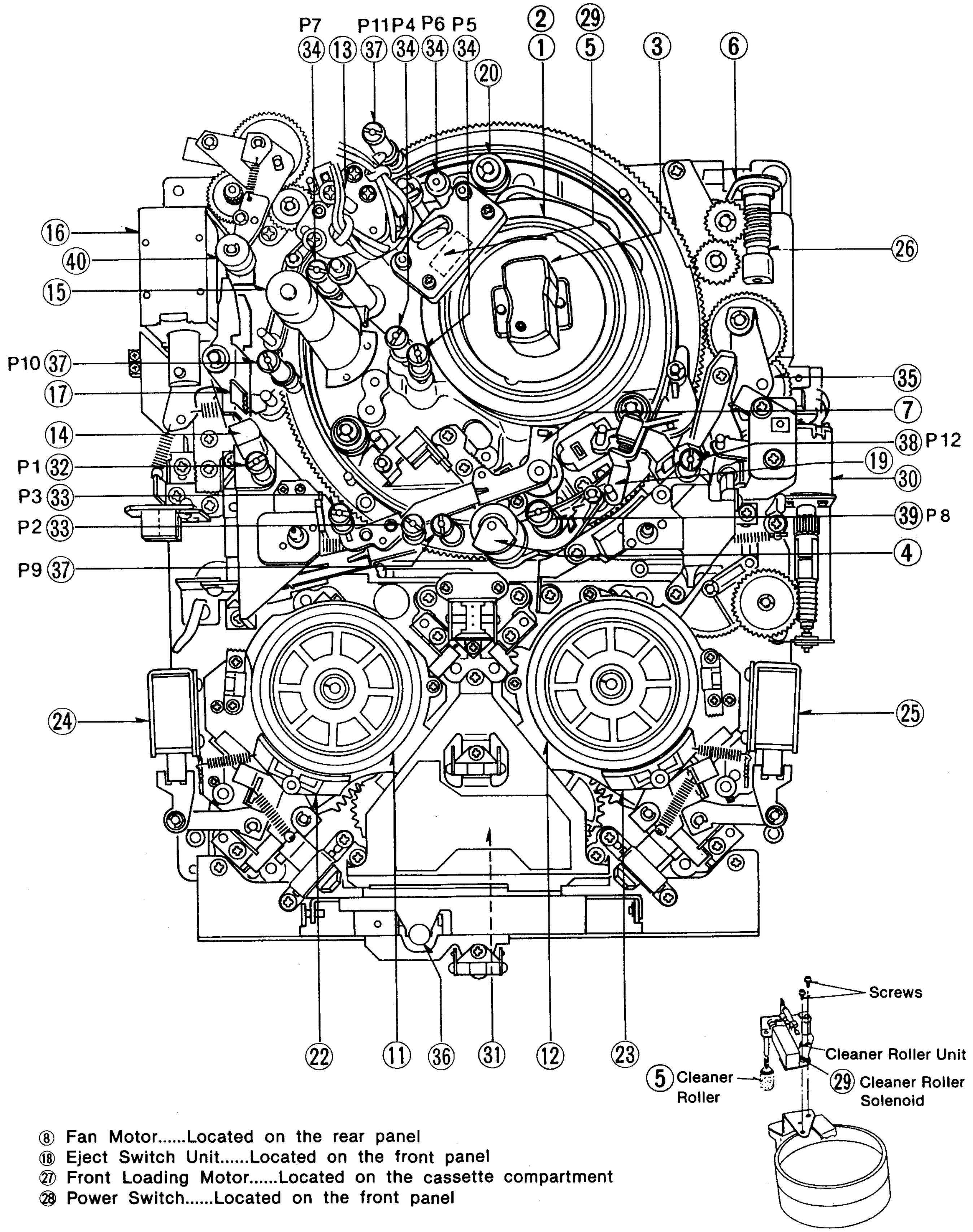
6. MAJOR MECHANISM PARTS REPLACEMENT AND ADJUSTMENT PROCEDURES 2-43
6-1. GENERAL 2-43
6-2. CENTER DRUM REPLACEMENT AND ADJUSTMENT 2-43
6-3. DRUM UNIT REPLACEMENT 2-49
6-4. S-REEL BASE UNIT/T-REEL BASE UNIT REPLACEMENT AND ADJUSTMENT 2-51
6-5. SUPPLY BRAKE UNIT AND TAKE UP BRAKE UNIT REPLACEMENT 2-53
6-6. SUPPLY BRAKE SOLENOID AND TAKE UP BRAKE SOLENOID REPLACEMENT 2-54
6-7. PINCH ARM UNIT REPLACEMENT 2-55
6-8. A/C HEAD REPLACEMENT 2-56
6-9. FULL ERASE HEAD REPLACEMENT AND ADJUSTMENT 2-58
6-10. POST ROLLER UNIT REPLACEMENT 2-58
6-11. CAPSTAN HOUSING UNIT REPLACEMENT AND ADJUSTMENT 2-59
6-12. PINCH SOLENOID AND PINCH PRESS LEVER REPLACEMENT AND ADJUSTMENT 2-60
6-15. TENSION SPRING PLATE REPLACEMENT 2-62
6-16. LOADING MOTOR AND LOADING MOTOR BELT REPLACEMENT 2-63
6-17. FRONT LOADING MOTOR REPLACEMENT 2-64
6-18. FAN MOTOR REPLACEMENT 2-65
6-19. EJECT SWITCH REPLACEMENT 2-66
6-20. POWER SWITCH REPLACEMENT 2-66
6-21. IP BASE UNIT REPLACEMENT 2-67
6-22. CAM GEAR REPLACEMENT AND ADJUSTMENT 2-68
6-23. RING ROLLER UNIT REPLACEMENT 2-69
6-24. SUB LOADING MOTOR REPLACEMENT 2-69
6-25. STOPPER SOLENOID REPLACEMENT AND ADJUSTMENT 2-70
6-26. WORM MOTOR UNIT REPLACEMENT (Reel Position Change Motor) 2-71
6-27. LOADING/UNLOADING, SUB LOADING/SUB UNLOADING COMPLETION SWITCHES POSITION ADJUSTMENT 2-72
6-28. CLEANER ROLLER REPLACEMENT 2-74
6-29. CLEANER SOLENOID REPLACEMENT AND ADJUSTMENT 2-74
6-30. SUPPLY REEL TABLE AND TAKE UP REEL REPLACEMENT AND ADJUSTMENT 2-76
6-31. CASSETTE IN SW ADJUSTMENT 2-77
6-32. V PHOTO SW ADJUSTMENT 2-77
6-33. UD PHOTO SW ADJUSTMENT 2-78
6-34. AC HEAD CLEANER UNIT REPLACEMENT 2-79
6-35. AC HEAD CLEANER PAD REPLACEMENT 2-80

MAINTENANCE AND MECHANICAL ADJUSTMENT PROCEDURES

1. AJ-D350 Maintenance Parts Chart and Parts Location

Location No.	Name		Part Number	Using Hour (Refer to HEAD ROTATION) 1500	3000	4500	6000	7500	9000	10500	12000	15000	24000	Page
1 *	Center Drum Unit		VEH0666KIT (E) VEH0665KIT (P)	500hr and Measure 250hr each										2-48
2	Drum Unit		VEG1189KIT (E) VEG1188KIT (P)	5000hr each										2-54
3	Slip Ring Unit		VXS0129	Replace 2500hr each										2-48
4	Pinch Roller Arm Unit		VXL2106	●	●	●	●	●	●	●	●	●	●	2-60
5	Cleaner Roller		VXP1326	●	●	●	●	●	●	●	●	●	●	2-79
6	Loading Motor Belt		VDV0156	●	●	●	●	●	●	●	●	●	●	2-68
7	Tension Adj Plate Unit		VXA4395		●		●		●		●	●	●	2-67
8	Fan Motor		VRF0063		●		●		●		●	●	●	2-70
9	Gears		—		◎		◎		◎		◎	◎	◎	
10	Tape Tension		—		○		○		○		○	○	○	
11	S Reel Table		VXR0230				●				●		●	2-56
12	T Reel Table		VXR0230				●				●		●	2-56
13	A/C Head Unit		VED0158				●				●		●	2-61
14	Full Erase Head		VBS0040				●				●		●	2-63
15	Capstan Housing Unit		VXD0110				●				●		●	2-64
16	Pinch Solenoid		VSJ0101				●				●		●	2-65
17	Pinch Press Lever Unit		VXL2100				●				●		●	2-65
18	Eject Switch		VSP0543				●				●		●	2-71
19	Inclined Post Base Unit		VXA4397				●				●		●	2-72
20	Ring Roller		—				△				△		△	2-74
21	Brake Torque		—				○				○		○	
22	Supply Brake Unit		VXL2119								●		●	2-58
23	Take Up Brake Unit		VXL2119								●		●	2-58
24	S Brake Solenoid		VSJ0100								●		●	2-59
25	T Brake Solenoid		VSJ0100								●		●	2-59
26	Loading Motor		VEM0323								●		●	2-68
27	Front Loading Motor		VEM0393								●		●	2-69
28	Power Switch		VSW0043								●		●	2-71
29	Cleaner Solenoid		VSJ0109								●		●	2-79
30	Sub-Loading Motor		VEM0395								●		●	2-74
31	Worm Motor Unit		VEM0397								●		●	2-76
32	Post Roller with Bearing	P1	VXP1293								●		●	2-63
33		P2	VXP0821								●		●	2-63
33		P3	VXP1429								●		●	2-63
34		P4	VXP0938								●		●	2-63
34		P5, 6, 7	VXP0819								●		●	2-63
35	Cam Gear		VDG0760									●		2-73
36	Stopper Solenoid		VSJ0102									●		2-75
37	Post Roller with Bearing	P9, 10, 11	VXP0821										●	2-63
38		P12	VXP1293										●	2-63
39		P8	VXP1294										●	2-63
40	A/C Head Cleaner Pad		VMF0367	●	●	●	●	●	●	●	●	●	●	2-85

Remark; ●: Replacement, ○: Confirmation or Adjustment, ◎: Grease Up, △: Cleaning
*Center Drum adjustment procedures are informed by Technical Information.
*Using Hour is referred to HEAD ROTATION HOUR on TEST MENU.
*● of Replacement time is Panasonic recommendation time.



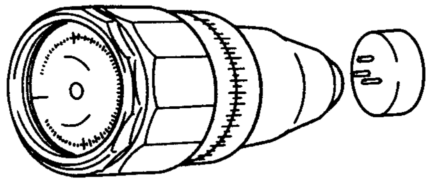
⑧ Fan Motor......Located on the rear panel
⑱ Eject Switch Unit......Located on the front panel
(27) Front Loading Motor......Located on the cassette compartment
(28) Power Switch......Located on the front panel

The specified fixtures and tools must be used to conduct adjustment requiring a fixture.

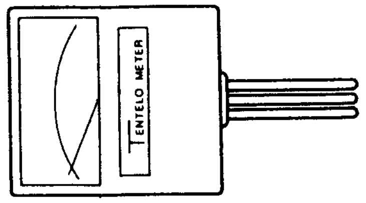
The following fixtures and tools are required to conduct complete Mechanical Adjustments.

Servicing Fixtures & Tools

1 **VFK71 (150g max.),**
2 **VFK0133 (1200g max.)**
Dial Torque Gauge
3 **VFK0134**
Dial Torque Gauge Adapter

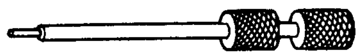


4 **VFK0132**
Back Tension Meter

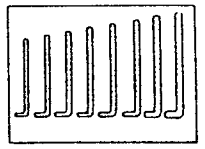


Tentelo Meter
Model: T2-H7-UM (7 ounces, 200 grams)

5 **VFK0293**
Post Driver (0.9mm)

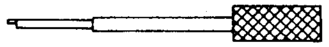


6 **VFK0326 (or purchase locally)**
Hex. Wrench Set

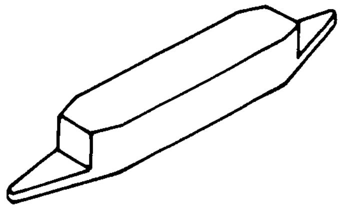


Gosho's
Hex keys No. 505-G
1.27, 1.5, 2.0, 2.5, 3.0

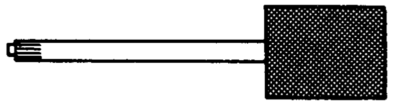
7 **VFK0357 (φ1.5)**
8 **VFK0358 (φ2)**
Eccentric Screwdriver



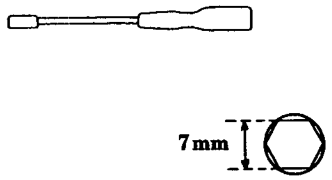
9 **VFK0363**
Post Height Fixture



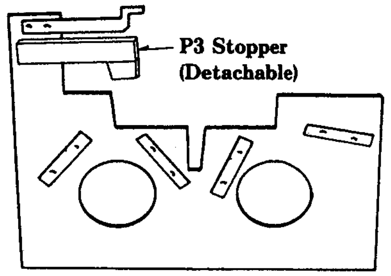
10 **VFK0446**
Fine Adjustment Screwdriver (3mmφ)



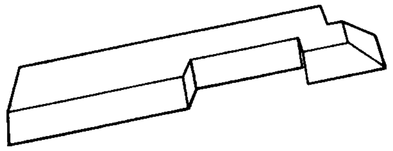
11 **VFK0676 (or purchase locally)**
Nut Driver (7mm)



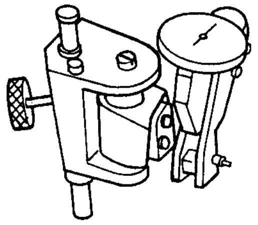
12 **VFK0719**
Mech Neutral Adjustment Plate



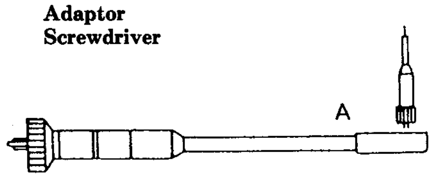
13 **VFK0722**
Inclined Post Angle Fixture



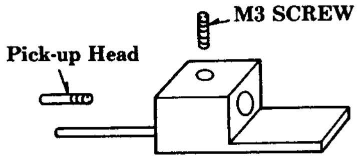
14 **VFK0737B**
Drum Replacement Tool



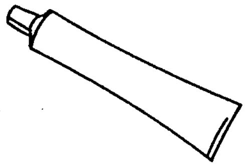
15 **VFK0740**
Torque Wrench A
16 **VFK0741**
Adaptor
Screwdriver



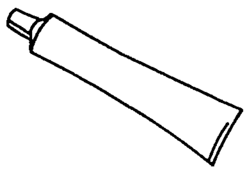
17 **VFK0742**
Micro Meter Pick-up Fixture
45 **VFK1031**
Pick-up Head



18 **VFK0749**
Froiral Grease (White)
(for plastic part)

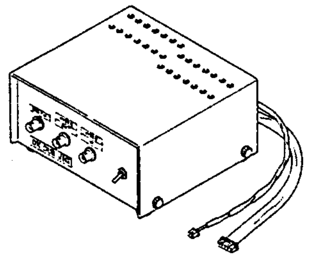


19 **MOR265**
Morlytone Grease (Black)
(for metal part)

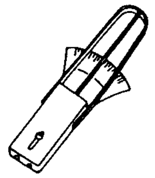


Servicing Fixtures & Tools

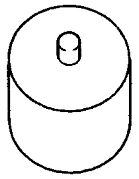
20 **VFK0753**
10th Dubbing Simulation Tool



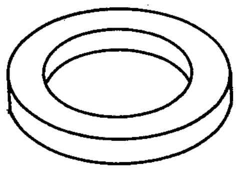
21 **VFK66**
Fan Type Tension Gauge



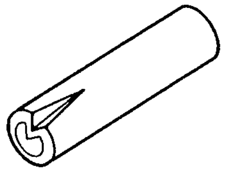
22 **VFK0771**
Calibration Block



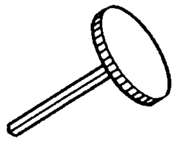
23 **VFK0772**
Reel Height Adj Tool



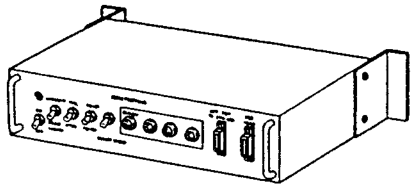
24 **VFK0779**
Position Change Driver



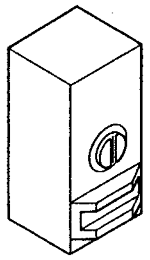
25 **VFK0811**
Hex Screw



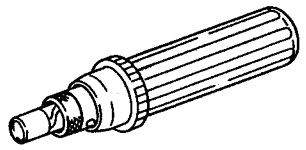
26 **VFK0832A**
Linearity/Head Height Adjustment Tool



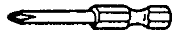
27 **VFK0869**
Pick Up Unit for VFK0737B



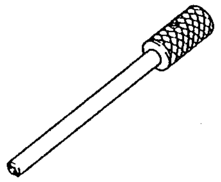
28 **VFK0878**
Torque Wrench B (Torque Adjustable)



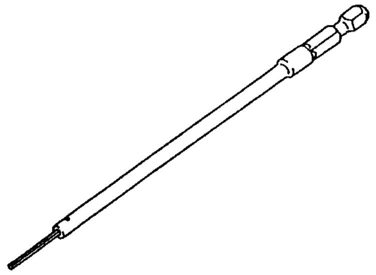
29 **VFK0881**
Cross Point Adaptor (for VFK0878)



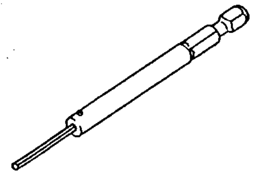
30 **VFK0910**
Post Shell Driver (1)



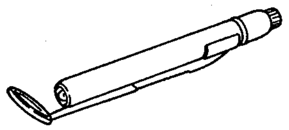
31 **VFK0912**
Post Axis Driver (3)



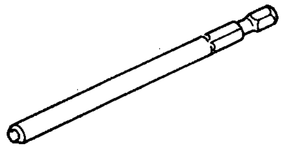
32 **VFK0920**
Post Axis Driver (4)



33 **VFK0948 (or purchase locally)**
Check Light

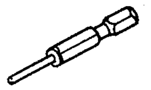


34 **VFK0955**
Post Shell Driver (2)



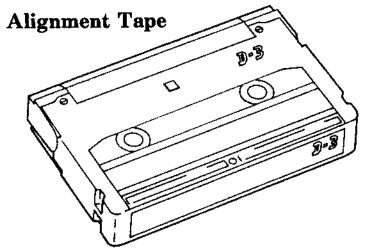
Servicing Fixtures & Tools

35 **VFK0956**
Hex Head Bit

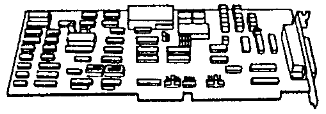


36 **VFM6080EC** } **VFM6180EC** }
37 **VFM6081EC** } **NTSC** **VFM6181EC** } **PAL**
VFM6086EC } **VFM6186EC** }

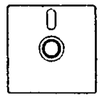
Alignment Tape



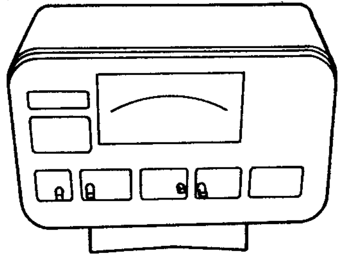
38 **DAQ-12 (QUATECH)**
(Locally purchase)



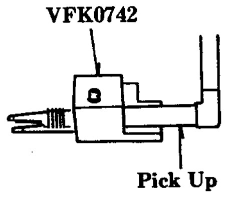
39 **VFK0989 (For ELMEC)**
VFK0990 (For QUATECH)
Head Height Soft



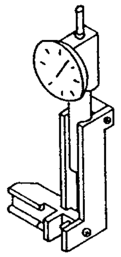
40 **Maker TESA TTA-20**
Micro Meter
(This is not Panasonic Tool)



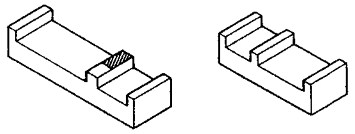
41 **Maker TESA GT-22**
Micro Meter Pick Up
(This not Panasonic Tool)



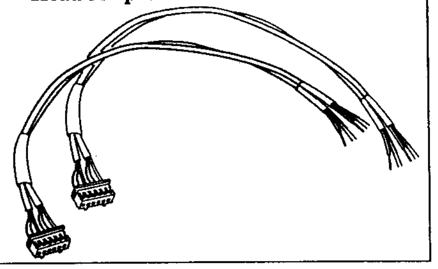
42 **VFK1008**
A/C Head Tilt Measurement Tool



43 **VFK1007**
Calibration Plate (1)
VFK1006
Calibration Plate (2)



44 **VFK1032**
Connector Cable for VFK0832A
Head Amp Unit



* : Factory Adjustment only

No.	Name	Part No.	Purpose
*1 2 3	Dial Torque Gauge (150 g) Dial Torque Gauge (1200 g) Dial Torque Gauge Adapter	VFK71 VFK0133 VFK0134	1. Loading Back Tension Torque Adjustment Take-up Reel Motor. 2. Take-up Reel Torque Adjustment 3. Supply Reel Torque Adjustment [These adjustment procedures are described in the servo section of electrical adjustment.]
4	Back Tension Meter	VFK0132	Tension Adjustment
5	Post Driver (0.9 mm)	VFK0293	Post height adjustment (P2, P3)
6	Hex. Wrench M2 Hex. Wrench M2.6 Hex. Wrench M3	VFK0326 (Set) VFK0326 (Set) VFK0326 (Set)	Tension Magnet Height Adjustment *1. Inclined Post Inclined Angle Adjustment (1) 2. Tension Adjustment (Fine)
7	Eccentric Screwdriver (φ1.5)	VFK0357	Tension adjustment (Coarse)
8	Eccentric Screwdriver (φ2)	VFK0358	1. Pinch Solenoid Position Adjustment *2. Inclined Post Inclined Angle Adjustment (2) 3. Drum Cleaner Unit Adjustment 4. Tension Arm Neutral Voltage Adjustment 5. A/C Head X Value Adjustment
*9	Post Height Fixture	VFK0363	*Post Height Pre-Adjustment
10	Fine Adjustment Screwdriver (3 mmφ)	VFK0446	1. Loading Completion SW Adjustment 2. Unloading Completion SW Adjustment 3. Sub-loading Completion SW Adjustment 4. Sub-unloading Completion SW Adjustment 5. Pinch Press Lever Position Adjustment
11	Box Wrench M4 Nut (7 mm)	VFK0676	A/C Head Height Adjustment
12	Mech Neutral Adjustment Plate	VFK0719	*1. P3 Inclined Angle Adjustment *2. Inclined Post Inclined Angle Adjustment (1) *3. Inclined Post Inclined Angle Adjustment (2) 4. Tension Arm Neutral Voltage Adjustment
*13	Inclined Post Angle Fixture	VFK0722	*Inclined Post Inclined Angle Adjustment (2)
*14	Drum Replacement Tool	VFK0737B	Center Drum adjustment/Linearity Measurement
*15 16	Torque Wrench A Adaptor Screwdriver	VFK0740 VFK0741	Center Drum Replacement Center Drum Replacement
*17	Micro Meter Pick-up Fixture Pick-up Head	VFK0742 VFK1031	*1. P3 Inclined Angle Adjustment *2. Inclined Post Inclined Angle Adjustment (1)
18	Froiral Grease (White)	VFK0749	Grease up for plastic part
19	Morlytone Grease (Black)	MOR265	Grease up for metal part (10 g)
20	10th Dubbing Simulation Tool	VFK0753	Video Level Total Confirmation
21	Fan Type Tension Gauge	VFK66	Pinch Solenoid Position Adjustment
*22	Calibration Block	VFK0771	Micro Meter Calibration
23	Reel Height Adj Tool	VFK0772	Reel Height Adj Tool
24	Position Change Driver	VFK0779	Center Drum Replacement
25	Hex Screw	VFK0811	*Center Drum Replacement
*26	Linearity/Head Height Adjustment Tool	VFK0832A	*1. Tape Linearity and Head Height Fine Adjustment
27	Pick Up Unit for VFK0737B	VFK0869	Pick up unit of VFK0737B for Replacement
*28	Torque Wrench B	VFK0878	A/C Horizontal Position, P1, P4~P12 Post Height Adjustments, Center Drum Replacement
29	Cross Point Adaptor	VFK0881	Adaptor for VFK0878
30	Post Shell Driver (1)	VFK0910	*Post Height Adjustment
31	Post Axis Driver (3)	VFK0912	P1, P4~P12 Post Height Adjustment
32	Post Axis Driver (4)	VFK0920	A/C Horizontal Position Adjustment
33	Check Mirror	VFK0936	Tape Transport Check
34	Post Shell Driver (2)	VFK0955	Post Height Adjustment
35	Hex Head Bit	VFK0956	Upper Drum Fix
36, 37	Alignment Tape	VFM6080EC VFM6081EC	Electrical Adj Tape Head Height Adj Tape
38	A/D Converter (DAQ-12)	Locally Purchase	Linearity and Head Height Adjustment
39	Head Height Soft	VFK0989/VFK0990	Linearity and Head Height Adjustment
*40	Micro Meter	TESA TTA-20	Inclined Post Angle Adjustment
*41	Micro Meter Pick Up	TESA GT-22	Inclined Post Angle Adjustment
*42	A/C Head Tilt Measurement Tool	VFK1008	A/C Head Tilt Measurement
*43	Calibration Plate (1) & (2)	VFK1007/VFK1006	A/C Head Tilt Measurement
*44	Connector Cable for VFK0832A	VFK1032	Head Amp Connector for Spare
*45	Pick-up Head	VFK1031	Pick-up Head for VFK0742

TESA

Switzerland	*Telephone*	*Fax*
TESA SA Bugnon 38 CH-1020 Renens	*021 634 15 51*	*021 635 75 35*
Pierre ROCH S.à r.l. Bugnon 38 CH-1020 Renens	*021 634 15 51*	*021 635 75 35*
England		
TESA METROLOGY LTD. Halesfield 8 GB-Telford TF7 4QN	*0952 581923*	*0952 585414*
TESA-Reference Standards Division Bradgate Street GB-Leicester LE4 OAW	*0533 629012*	*0533 514762*
THOMAS MERCER LTD. Eywood Road GB-St. Albans AL1 2ND	*0727 55313*	*0727 868455*
Germany		
LEITZ MEßTECHNIK GmbH Siegmund-Hiepe Straße 2-12 D-6330 Wetzlar	*06441 207 0*	*06441 207122*
TESA LEITZ GmbH Netzestraße 32 D-7140 Ludwigsburg	*07141 87 470*	*7141 874 788*
France		
TESA FRANCE 27-29 av. Ph.-Auguste F-75540 Paris	*1 44 93 10 00*	*1 43 71 74 79*
TESA FRANCE 21 av. de-Lattre-de-Tassigny F-94134 Fontenay-sous-Bois	*1 45 14 66 00*	*1 45 14 66 11*
Italy		
TESA ITALIA S.r.l. Via Spartaco 30/34 1-20135 Milano	*02 5519 36 32*	*02 5501 22 33*
Japan		
TESA SEIMITSU CO. LTD. 23-1, 2 Chome, Shiba Minatoku Tokyo-Japan	*03 3769 1421*	*03 3769 3909*
USA		
BROWN & SHARPE MANUFACTURING CO. 200 Frenchtown Road North Kingstown RI 02852-USA	*401 886 2000*	*401 886 2762*
TESA MEASUREMENT SYSTEMS 22530 Heslip Drive Novi MI 48375-USA	*313 347 5900*	*313 347 5906*
STANDARD GAGE CO. INC. 70 Parker Ave Poughkeepsie NY 12602-USA	*914 471 3100*	*914 471 3143*

IMPORTANT NOTICE

1. VFK0763 Torque Wrench

Upper Drum torque value of AJ-D350 has been changed from 6kg to 8kg. Therefore please use VFK0878 (Variable torque Driver) instead of VFK0763.

2. VFK0758 Fan Type Tension Gauge

VFK0758 and VFK66, these are almost the same. VFK0758 has changed the point of the tension gauge for small space. D3 VTRs have enough space. Therefore please use the VFK66 instead of VFK0758.

3. New post drivers (VFK0910, 0912, 0920, 0955)

New posts P1 to P12 and A/C Horizontal position's screws have been changed in later models. New fixing screws are added to improve tape path linearity. Old type posts had no specified screw torque control.

With the new type of posts the torque is adjusted using a torque driver. Torque value is tightened to 2.5kg for P1 to P12 by VFK0910, VFK0912 and VFK0955. A/C Horizontal position torque value is to 5kg by VFK0920.

4. New A/D Converter (DAQ-12)

A/D converter has been changed to a new type manufactured by QUATECH'S. VFK0853 is discontinued. The new A/D converter can be purchased locally, Please refer to the international distributors as follows.

QUATECH

662 Wolf Ledges Pkwy. • Akron, OH 44311
Telephone: (216) 434-3154
Fax: (216) 434-1409

AUSTRALIA

INTERWORLD ELECTRONICS &
COMPUTER
1G Eskay Road
Oakleigh South
Victoria 3167
AUSTRALIA
Telephone: (03) 563-7066
Fax: (03) 563-7337
Toll Free: 008-335103

FRANCE

ELEXO
BP 24-91371
Verrieres-Le-Buisson
Cedex
FRANCE
Telephone: 33-1-69302880
Telex: 600 517 F
Fax: 33-1-69306851

ISRAEL

RCM Ltd.
31 Habarzel St.
P.O. Box 39844
Tel-Aviv
ISRAEL
Telephone: 972-03-5447885
Fax: 972-03-5447290

NETHERLANDS

ACAL AURIEMA
doornakkersweg 26
5642 MP eindhoven
NETHERLANDS
Telephone: 040-816565
Fax: 040-811815

CANADA

INTERWORLD VCR
1415 Welch st.
North Vancouver, B.C.
CANADA V7P 1B5
Telephone: 604-984-4171
Telex: 04-352875
Fax: 604-984-8357
Toll- Free: 1-800-663-6001
TORONTO OFFICE
Telephone: 416-513-7027

FINLAND

LAB HI-TECH OY
Kaantopiiri 2B
02210 Espoo
FINLAND
Telephone: +358-0-804-2522
Fax: +358-0-803-9741

ITALY

N.C.S. COMPUTER ITALIA
21013 Gallarate
Via Pegoraro, 2
Varese
ITALY
Telephone: 0331/770016
Fax: 0331/772000

SINGAPORE

Bliss Services Pte Ltd
1 Rochor Canal Road
#05-04 Sim Lim Square
SINGAPORE 0718
Tel: (65) 338-1300
Fax: (65) 338-1900

ENGLAND

DIAMOND POINT
INTERNATIONAL
9 North Point Business Estate
Enterprise Close
Medway City Estate
Rochester upon Medway
Kent ME2 4L4
ENGLAND
Telephone: 634-722-390
Fax: 634-722-398

GERMANY

JUPITER ELECTRONIC
SYSTEMS GMBH
Eichenweg 24
D-6454 Bruchkobel
GERMANY
Telephone: 06181/75041
Fax: 06181/79721

KOREA

RM. 401
Namkog BLDG, 897-13
Daichi-Dong, Kangnam-Ku
Seoul, KOREA
Tel: 82-2-538-4001
Fax: 82-2-538-4069

SPAIN

SANTA Barbara SA
Vergos, 55bls, local 3 Bajos
08017 Barcelona
SPAIN
Tel: 34-3-203-9916
Fax: 34-3-203-9950

2. DISASSEMBLY PROCEDURES

2-1. TOP PANEL REMOVAL

1. Remove power cord from unit before disassembly.
2. Unscrew the 4 screws (A) and remove the 3 Top Panels.

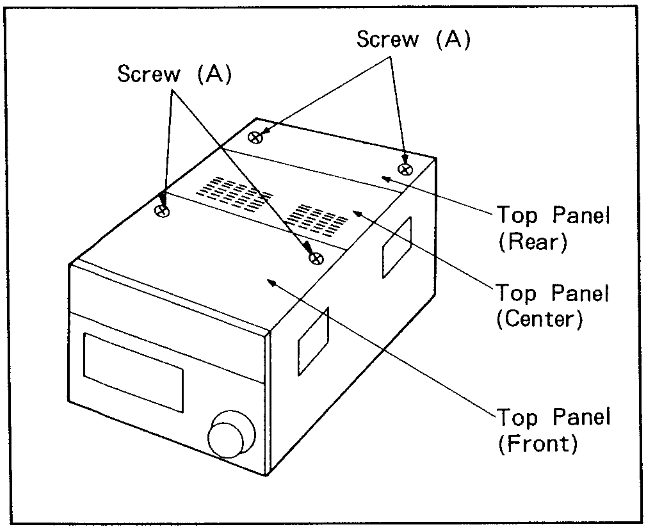

Screw (A)
Screw (A)
Top Panel (Rear)
Top Panel (Center)
Top Panel (Front)

Fig. 1-1 Top Panel Removal

2-2. BOTTOM PANEL REMOVAL

1. Unscrew the 5 screws (B) and remove the Bottom Panel.

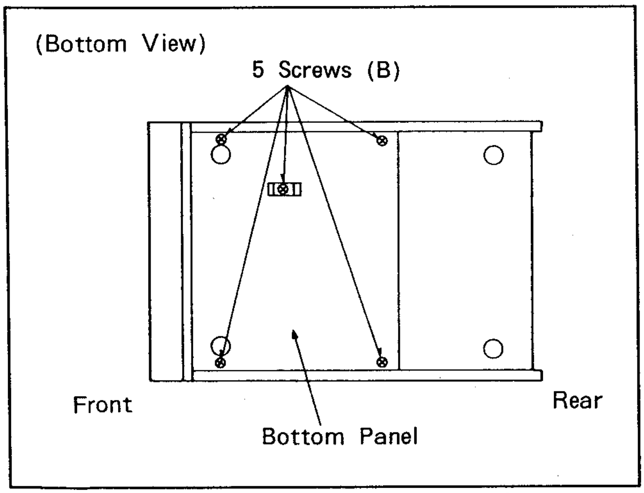

(Bottom View)
5 Screws (B)
Front
Rear
Bottom Panel

Fig. 1-2 Bottom Panel Removal

2-3. FRONT LOADING (CARRIAGE UNIT) REMOVAL

1. Remove the Top Panel.
2. Remove 5 screws (D) and 2 hinges (E), then turn up the Rec Amp P.C.Board, and remove the carriage Fix Plate (F) and (R) as shown in Figure 1-3-2.

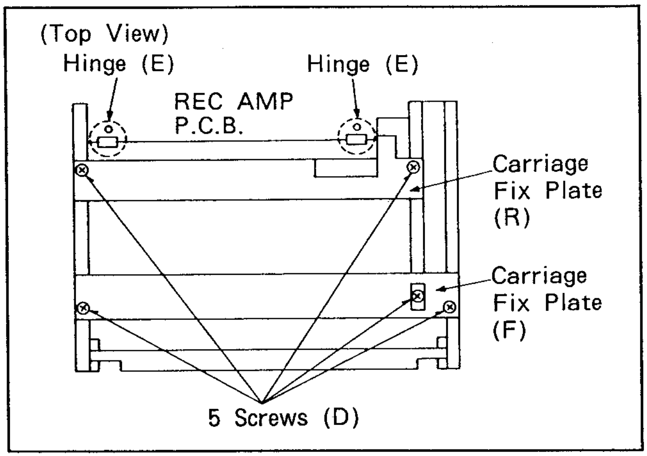

(Top View)
Hinge (E)
Hinge (E)
REC AMP P.C.B.
Carriage Fix Plate (R)
Carriage Fix Plate (F)
5 Screws (D)

Fig. 1-3-2 Carriage Fix Plate Removal

3. Disconnect the connector P709 and unscrew the 4 screws (G), then lift the Front Loading (carriage) Unit up to remove as shown in Figure 1-3-3.

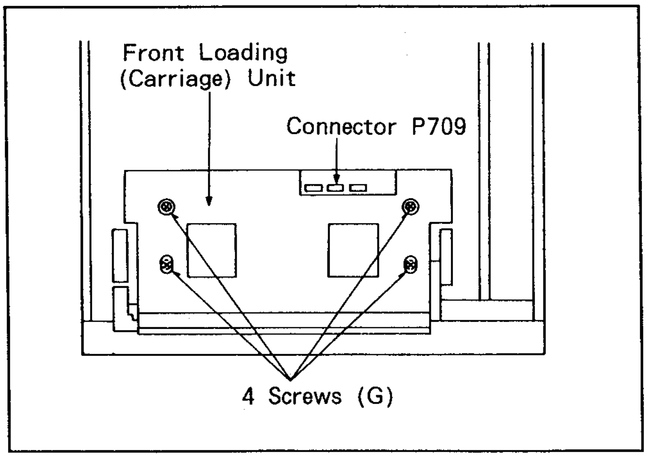

Front Loading (Carriage) Unit
Connector P709
4 Screws (G)

Fig. 1-3-3 Front Loading (Carriage Unit) Removal

2-4. L1, L2, L3, L4 P.C.BOARD AND SHIELD PLATE REMOVAL

1. Remove the Bottom Panel, refer to item 1-2.
2. Open the Control Panel.
3. Pull out the L1, L2, L3, L4 P.C.Boards and Shield Plate as shown in Figure 1-4-1.

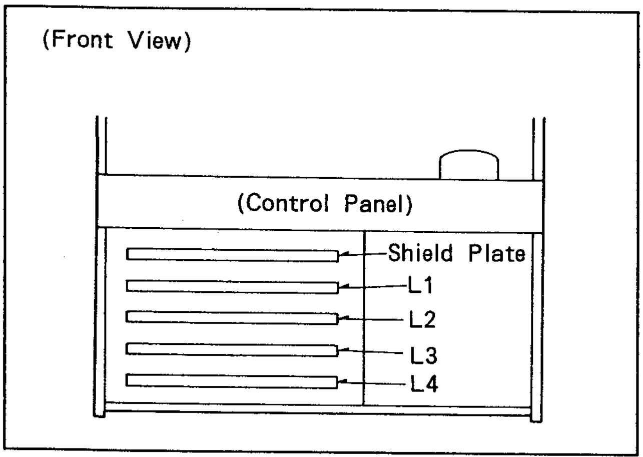
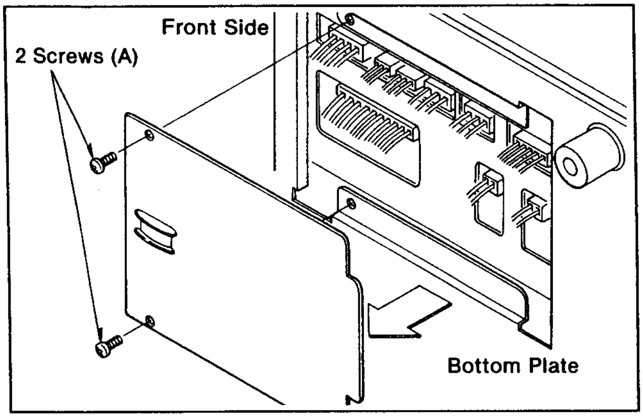

(Front View)
(Control Panel)
Shield Plate
L1
L2
L3
L4

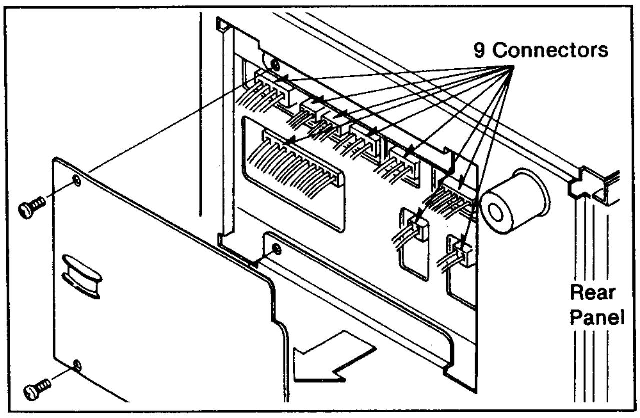
Fig. 1-4-1 P.C.Board Removal

2-5. POWER BOX REMOVAL

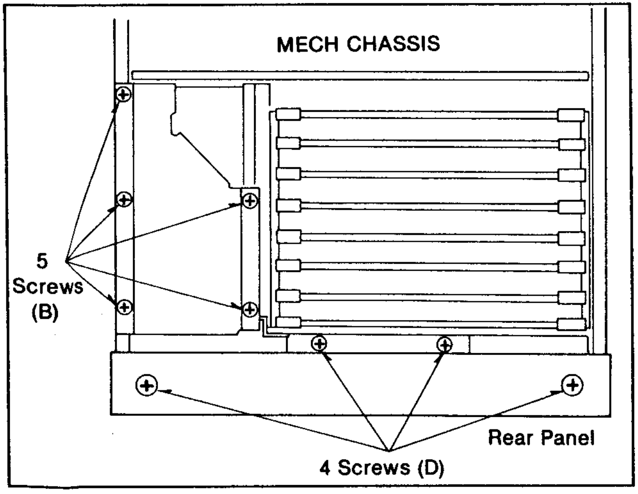
1. Unscrew the 2 screws (A) and remove the bottom plate cover as shown below.


Front Side
2 Screws (A)
Bottom Plate

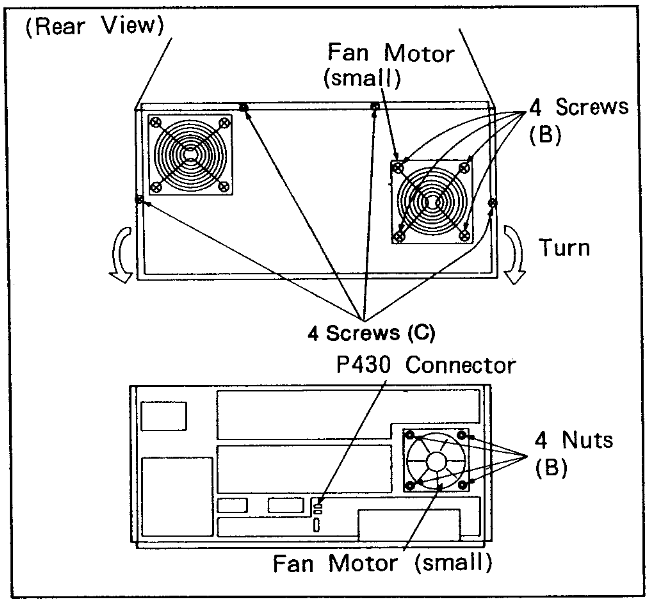
2. Disconnect the 9 connectors in the power box as shown below.


9 Connectors
Rear Panel

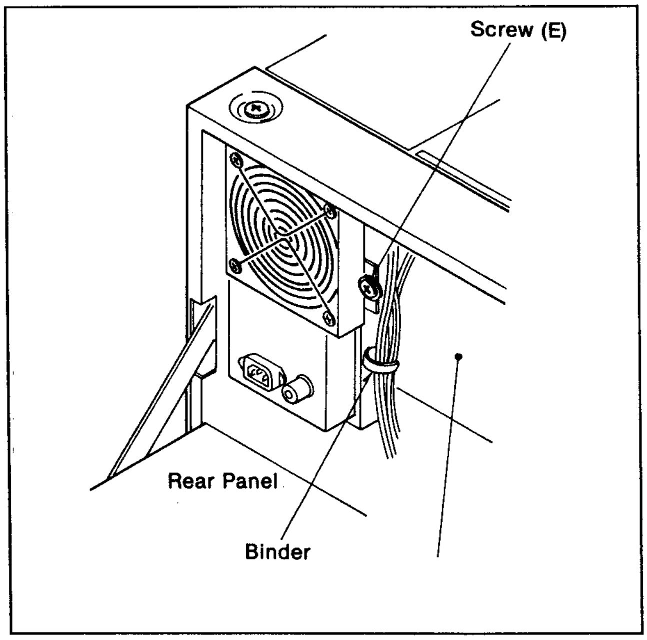
3. Remove the top panel. (Refer to item 2-1)
4. Unscrew the 5 screws (B) and remove the power unit angle.
5. Unscrew the 4 screws (C) and turn open the rear panel as shown below.
6. Unscrew the 4 screws (D) and remove the top cover angle.


MECH CHASSIS
5 Screws (B)
Rear Panel
4 Screws (D)

7. Remove the binder on the AUDIO IN/OUT P.C.Board from connector as shown below.


(Rear View)
Fan Motor (small)
4 Screws (B)
Turn
4 Screws (C)
P430 Connector
4 Nuts (B)
Fan Motor (small)

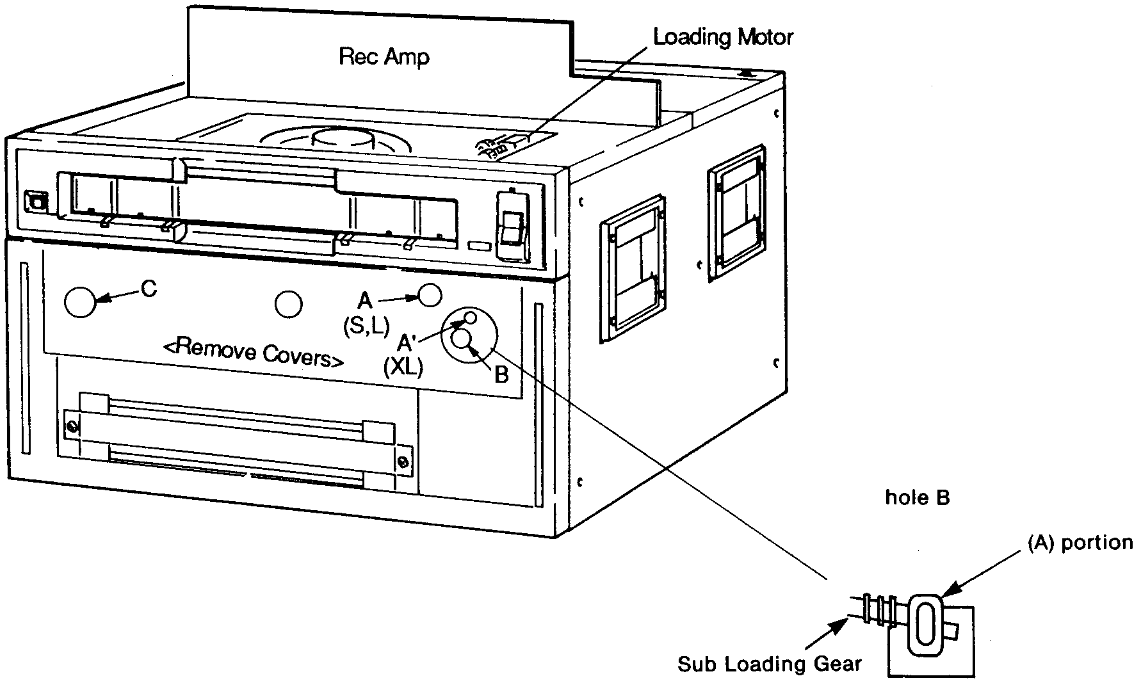
8. Unscrew a screw (E) and full out the power box from rear panel as shown below.


Screw (E)
Rear Panel
Binder

3. AJ-D350 MANUAL TAPE EJECT

If the cassette tape cannot be ejected due to power failure, manual eject can be carried out as follows.

1. Remove the front panel.
2. Open the REC AMP board by gently pulling the tow plastic retaining clips.
3. Gently rotate the loading motor clockwise to unload the threading mechanism. Do not allow the tape to become too loose.
4. Insert a screw driver into hole A (S and L cassettes) or A' (XL cassettes) and knock the take-up reel manual drive lever continuously to take up the slack tape.
5. Repeat operations 3 and 4 until the tape is off from the drum.
6. Insert a flat blade screwdriver to A portion into hole B and gently rotate the pulley clockwise (manual sub-unloading).
7. Insert a screwdriver into hole A (S and L cassettes) or A' (XL cassettes), and knock the take-up reel manual drive lever continuously to take up the slack tape.
8. Repeat item 6 and 7 until tape is completely taken up into the cassette.
9. Insert a flat blade screwdriver into the hole C and rotate counter-clockwise until the tape is ejected.



4. RECOMMENDED CLEANING AND CONFIRMATION PROCEDURE

Frequent cleaning and maintenance, as listed this section, will assure optimum performance and longer life of your AJ-D350.
Maintenance parts replacement is described in Maintenance procedure section.

Please refer to the table of contents for your particular application.

1. Required Material
2. Recommended Schedule
3. Head Cleaning
4. Pinch roller, capstan, post guides
5. Brush Assemblies
6. Brakes & Reel table
7. Cleaning Machines table
8. Lubrication

CLEANING MAINTENANCE PROCEDURES

4-1. MATERIALS REQUIRED

1. Head cleaning fluid (lifting solvent)
2. Lint-free head cleaning cloth
3. Canned air
4. Molyton grease (Panasonic part number : MOR265 and VFK0749)
5. Head inspection mirror

4-2. RECOMMENDED SCHEDULE

The following list is a recommented cleaning and checking schedule. The frequency of maintenance depends on the actual use and operating environment and should be modified accordingly.

1. Daily: - Cleaning of Upper and center Drum & A/C Head Assembly.
2. Weekly: - Cleaning of Tape path Upper and Center and Lower Drum, A/C Head, Full Erase Head, Tape Post Guides, Pinch Roller, Capstan.
3. Monthly: - Cleaning of Reel Base, Cassette Assembly.
4. 1000 hours or 3 months
   Check the tape tension and brake torque.
5. 2000 hours or 6 months
   Lubricate gears and mechanical parts.
6. 4000 hours or 1 year
   Clean out machine with canned air.

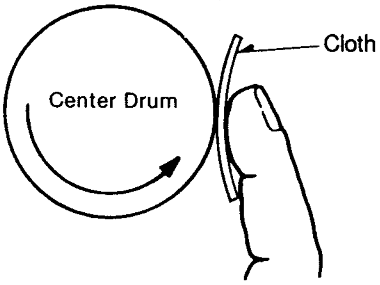
4-3. CLEANING PROCEDURES

Note: All procedures should be performed with AC power OFF.

(1) Video Head Cleaning Method: (Daily)

Clean heads by applying even pressure and rotating center drum a few turns (as shown). Never wipe in an up and down motion.

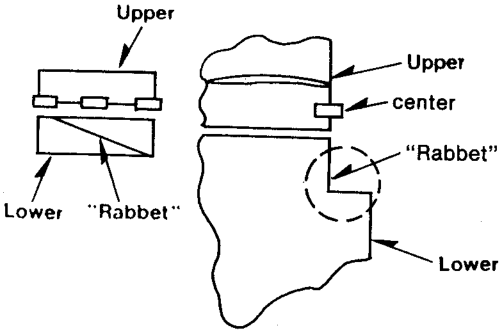
1. Clean with cleaning liquid
2. Wipe dry Clean heads until the cleaning cloth does not show any sighs of dirt.
3. Check that no thread from the cleaning cloth remain on the heads.



TAPE PATH CLEANING METHOD: (WEEKLY)

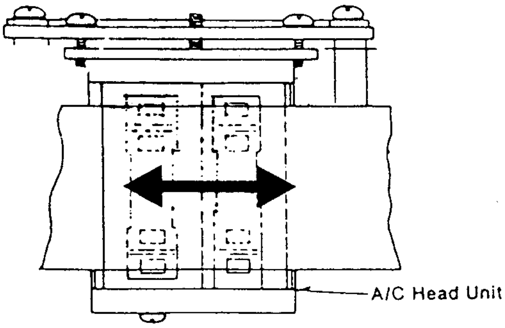
(2) Lower Drum Cleaning Method: (Weekly)

Clean the rabbet guide with a sharpened toothpick. Check that no threads from the cleaning cloth remain on the heads. Use an inspection mirror to check for any scratches or signs of wear on the drum assembly.



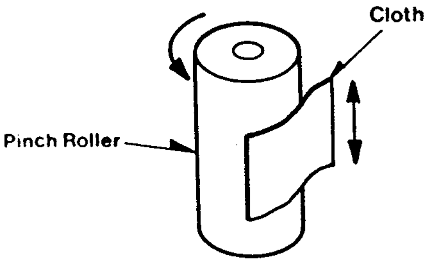
(3) A/C Head and Full Erase Head Cleaning Method: (Weekly)

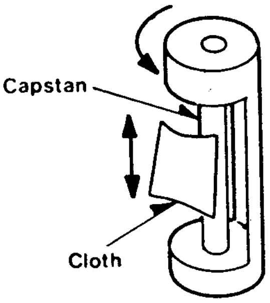
Clean the A/C head and Full erase head with cleaning fluid then wipe dry.



(4) Pinch Roller, Capstan Post Roller Cleaning Method: (Weekly)

The pinch roller should be cleaned with a lint-free cloth and cleaning fluid.
Rotate the roller and clean its entire surface using an up and down motion until the cleaning cloth does not show any signs of dirt. The capstan and post roller should be cleaned in the same manner. In the case of the post roller, only a little cleaning fluid should be used to avoid damaging the ball-bearing.

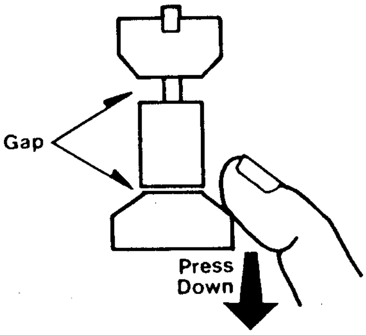




(5) Post Guides Cleaning Method: (Weekly)

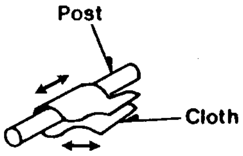
Post guides P1-P12 should be pushed down to create a gap at the top of the guide.

Note: Cleaning should ONLY be performed using a dry cloth to prevent damage to the ballbearing.



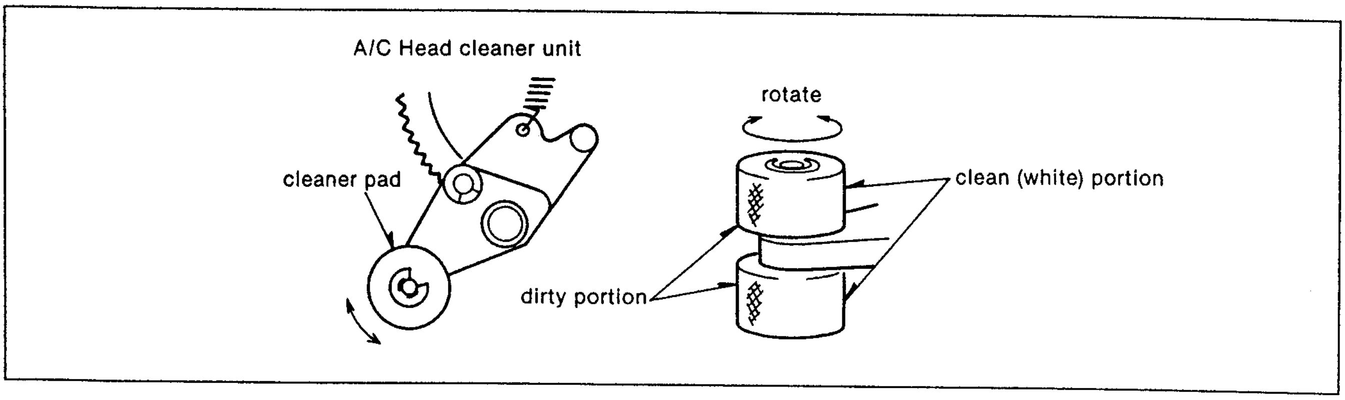
(6) Fixed Post Cleaning Method: (Weekly)

Fixed posts should be cleaned with cleaning fluid in the direction of tape travel. At the same time, check for any wear at the point where the edge of the tape makes contact.



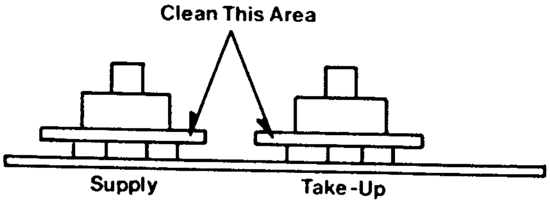
(7) A/C Head Cleaner Pad Cleaning Method: (Weekly)

Rotated the cleaner pad so that the clean position (white portion) can touch the A/C Head by hand as shown in Figure.


A/C Head cleaner unit
rotate
cleaner pad
clean (white) portion
dirty portion

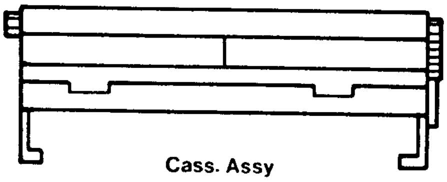
(8) Reel Table Cleaning Method: (Monthly)

The reel table brake contact surface should be rotated and the whole surface cleaned with cleaning fluid and wiped dry.


Clean This Area
Supply
Take-Up

(9) Cassette Assembly Cleaning Method: (Monthly)

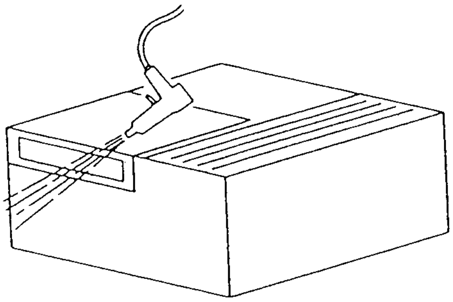
Any dust in the cassette assembly should be vacuumed out and the assembly wiped clean with a dry, lint-free cloth. Check the LED's and tape end sensors.



(10) CLEANING OF THE MACHINE'S INTERIOR (Yearly)

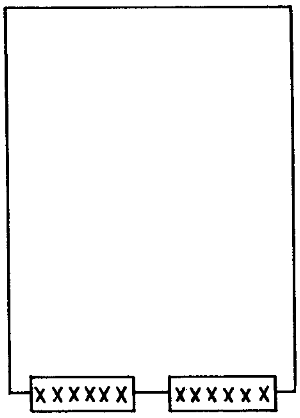
1) MECHANICAL SECTION
Remove the front loading mechanism and cover the drum assembly to prevent dust from contaminating the video heads, then blown out any dust from the chassis and front-loading mechanism with an air-gun.

Note:
Ensure that dust is blown out of the machine and NOT back inside it.

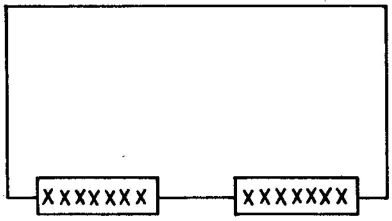


2) ELECTRICAL SECTION

Below the dust from the gaps between the printed-circuit boards with the air-gun. Remove the bottom plate from the machine and blow the dust from around the mother board and the fan motor unit. Clean edge connectors with connector contact cleaner.

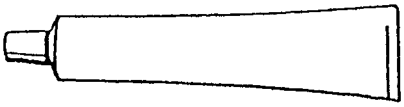
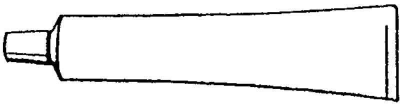


Bottom of Mechanical



Behind of Mechanical

4-4. LUBRICATION OF THE GEARS AND SLIDING SURFACES (EVERY 2000 HOURS OR EVERY 6 MONTHS OF OPERATION)

MOR265: Morlytone Grease (Black) (for metal part)	VFK0749 ; Froiral Grease (White) (for plastic part)
	

A. Grease Up Procedures

1. Turns power off.
2. Remove the cassette compartment.
3. Confirm the mechanism is unloading condition.
4. Confirm the grease of main mechanism parts, if any dust are sticked, clean them.
5. Grease the plastic part with Froiral Grease, part number VFK0749 (Panasonic order number), and metal part with Mortion Grease MOR265. The parts positions are described following step B.
6. Set the mechanism to loading completion condition.
   (1) Rotate sub-loading motor CCW until sub-loading completion.
   (2) Push down the Loading Ring Connection Gear and Keep it, and rotate Loading Ring Gear CCW by hand until loading completion Gear.
7. Repeat item 4 and 5.
8. Set the mechanism unloading completion by reverse way of item 6.

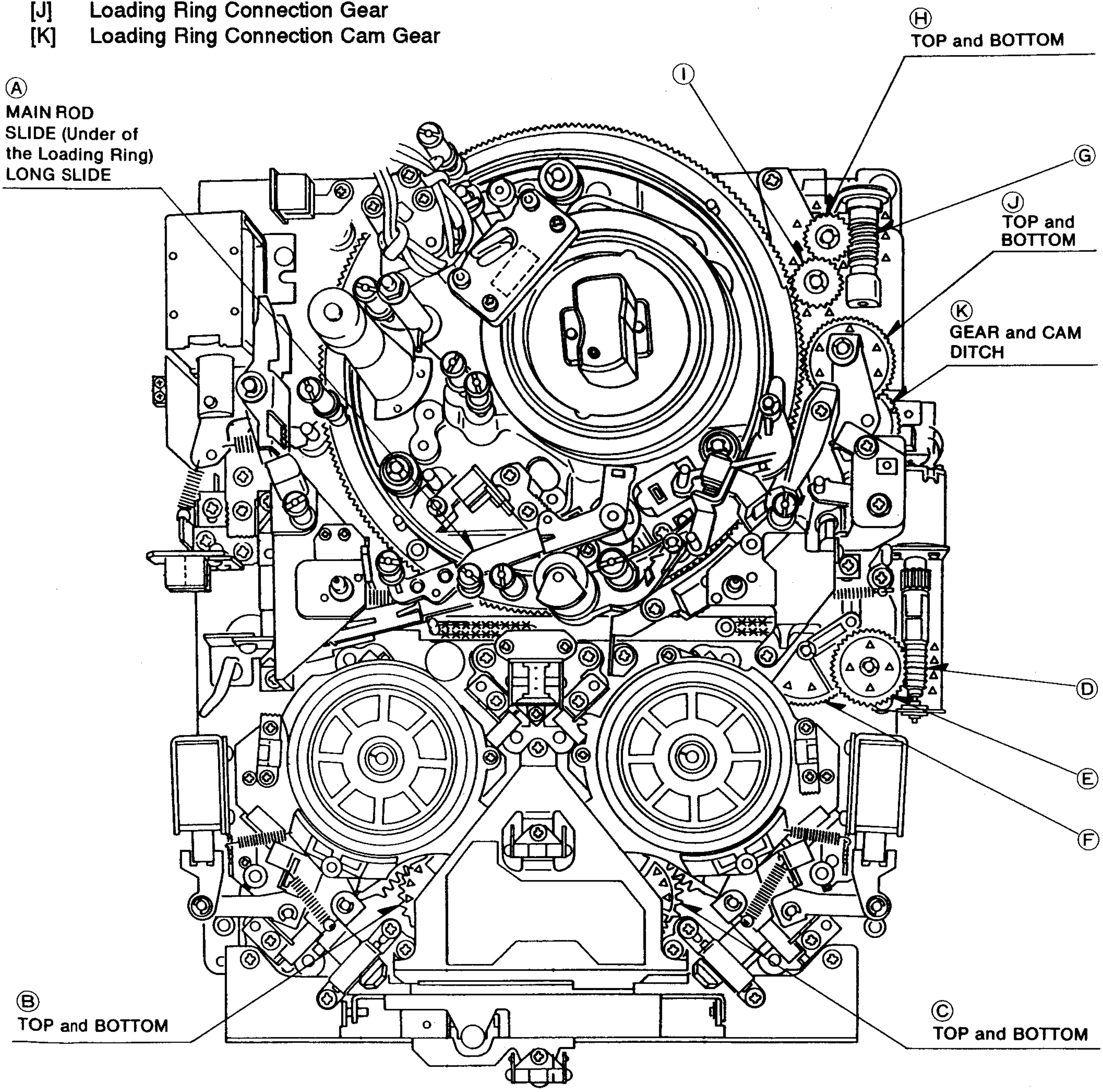
B. Mechanism Parts

Grease up the following parts if they are dried.

(1) xxxxx Part : Morlytone Grease MOR265.
- [A] Main Lod Ditch 3 portions

(2) ◆◆◆◆◆ Part : Froiral Grease VFK0749 (or Froiral G-31SB)
- [B] Reel Base Drive Gear (Left Side)
  Reel Base Drive Wheel (Gear Part)
- [C] Reel Base Drive Gear (Right Side)
  Reel Base Drive Wheel (Gear Part)
- [D] Sub-Loading Worm Gear
- [E] Sub-Loading Gear
- [F] Sub-Loading Drive Gear
- [G] Main Loading Worm Gear
- [H] Main Loading Connection Gear
- [I] Loading Ring Drive Gear
- [J] Loading Ring Connection Gear
- [K] Loading Ring Connection Cam Gear

× × × × : MOR265 Grease, Morlytone Grease
◇◇◇◇: VFK0749 Grease, Froiral Grease

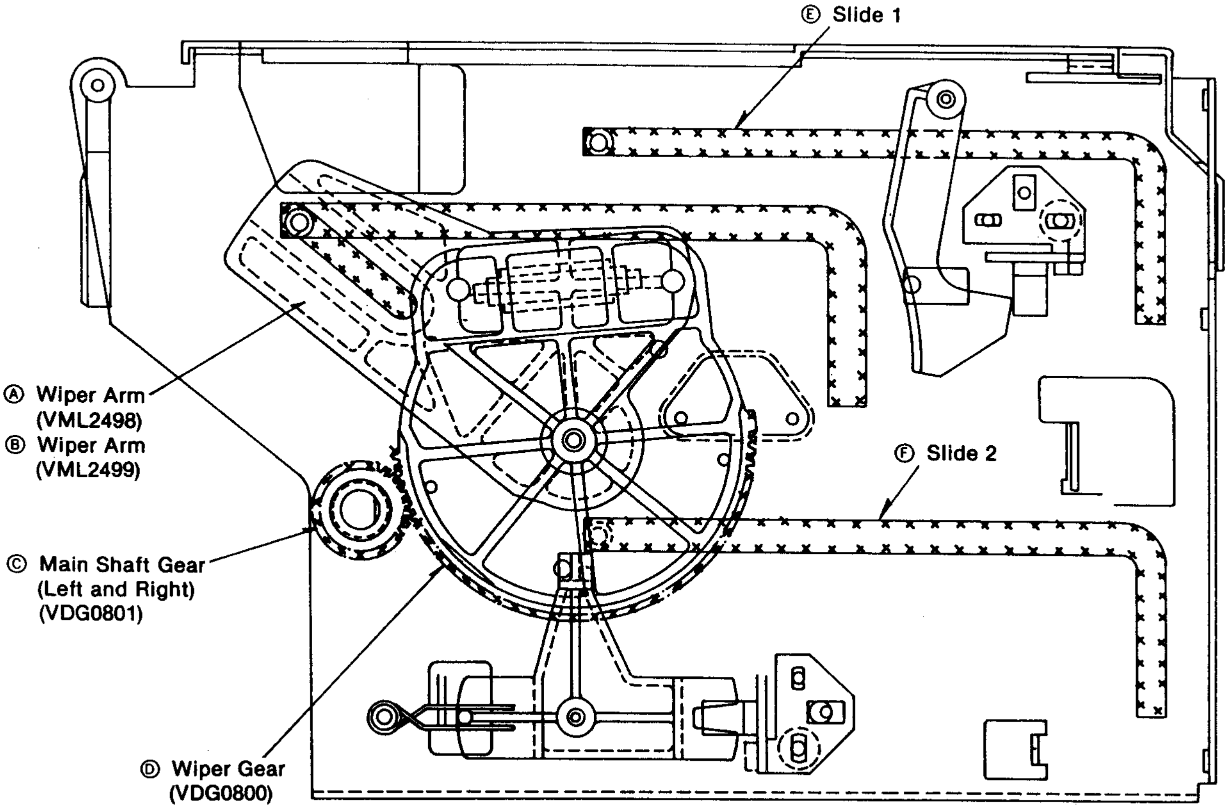

Ⓗ TOP and BOTTOM
Ⓘ
Ⓐ MAIN ROD SLIDE (Under of the Loading Ring) LONG SLIDE
Ⓖ
Ⓙ TOP and BOTTOM
Ⓚ GEAR and CAM DITCH
Ⓓ
Ⓔ
Ⓕ
Ⓑ TOP and BOTTOM
Ⓒ TOP and BOTTOM

C. Cassette Compartment

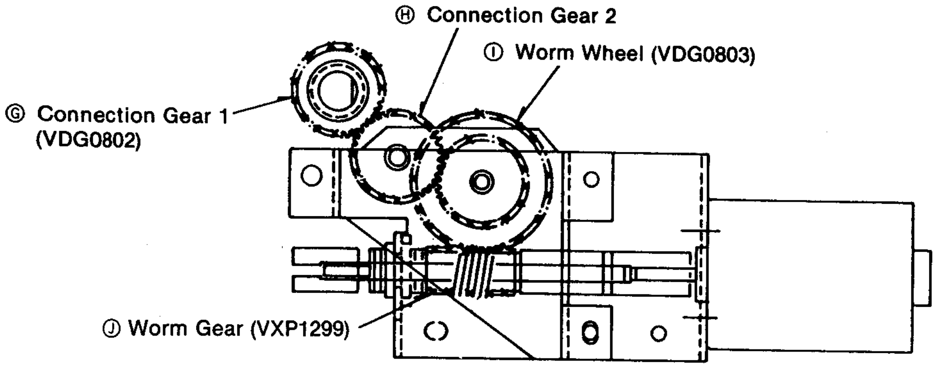
(1) Clean the any dust of cassette compartment and grease up portion.
(2) Grease up if the following parts (3) are dried.
(3) Cassette Compartment Parts
Grease up the following parts with Froiral Grase (Panasonic Part number VFK0749).

<Cassette Compartment Unit>
[A] Wiper Arm (Right)
[B] Wiper Arm (Left)
[C] Main shaft Gear (Right and Left)
[D] Wiper Gear
[E] Slide 1
[F] Slide 2

<Front Loading Motor>
[G] Connection Gear 1
[H] Connection Gear 2
[I] Worm Wheel
[J] Worm Gear


Ⓔ Slide 1
Ⓐ Wiper Arm (VML2498)
Ⓑ Wiper Arm (VML2499)
Ⓕ Slide 2
Ⓒ Main Shaft Gear (Left and Right) (VDG0801)
Ⓓ Wiper Gear (VDG0800)

<Cassette Compartment Unit>

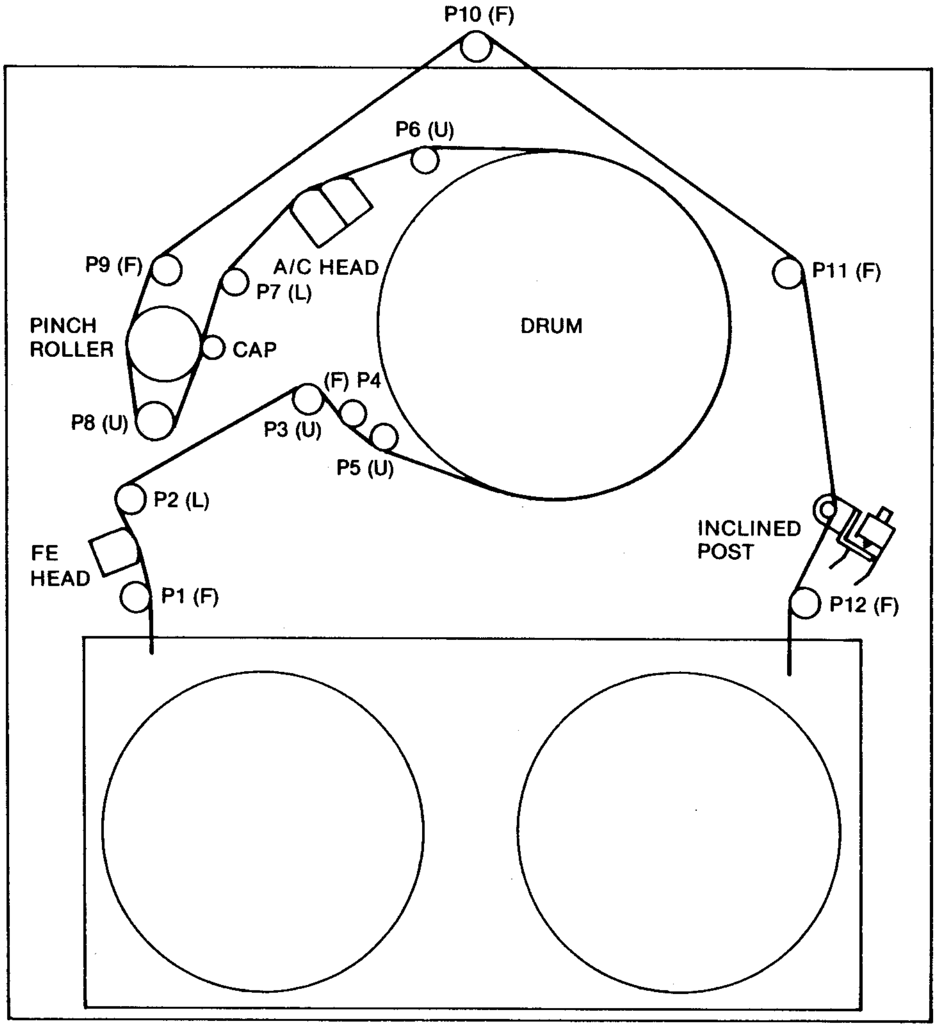

Ⓗ Connection Gear 2
Ⓘ Worm Wheel (VDG0803)
Ⓖ Connection Gear 1 (VDG0802)
Ⓙ Worm Gear (VXP1299)

<Front Loading Motor>

5. MAIN MECHANISM ADJUSTMENT PROCEDURES

5-1. TAPE TRANSPORTATION POSTS NAME

There are 12 Posts Roller with bearing P1 through P12, one fixed Inclined post, and A/C Head.
P1 through P12 posts need height adjustment.
P3 post needs height adjustment, tension adjustment and inclined angle adjustment.
the inclined angle of P3 post is adjusted in the factory, so the adjustment needs for factory only.
Inclined post needs factory inclined angle adjustment, because the post is not maintenance part, so do not adjust in the field.
A/C head needs tilt adjustment, height adjustment, azimuth adjustment and X value adjustment.
The tilt angle of the A/C head influences the exit portion of RF envelope linearity adjustment.


P10 (F)
P6 (U)
P9 (F)
A/C HEAD
P7 (L)
P11 (F)
PINCH ROLLER
CAP
DRUM
(F) P4
P8 (U)
P3 (U)
P5 (U)
P2 (L)
INCLINED POST
FE HEAD
P1 (F)
P12 (F)

(U): UPPER LIMIT (F): FREE (L): LOWER LIMIT

5-2. Tentelo Meter Calibration

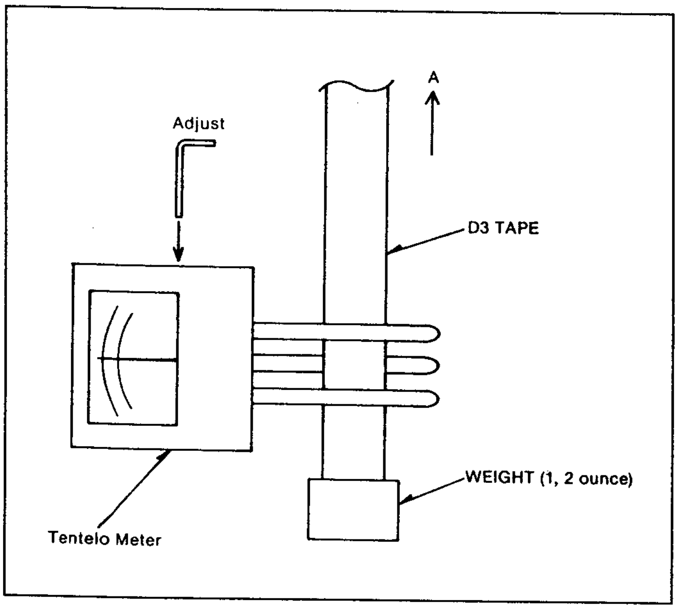
Specification : 1 ounce
2 ounce scale compensation Mode
: D3 Tape Pull up
Tape speed 83.880mm/sec

<STEP 1>

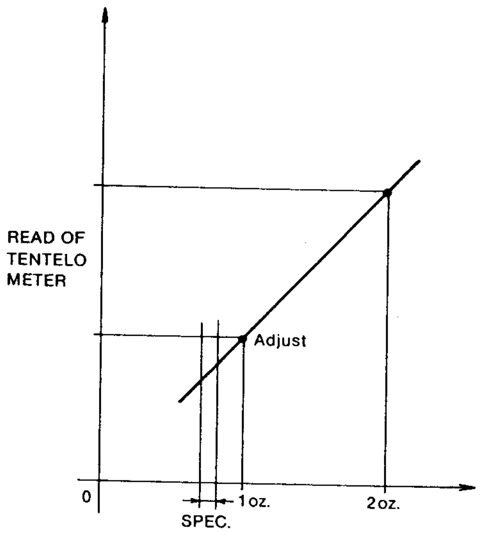
1. Connect the one ounce calibration weight to the D3 tape (about 30cm).
2. Set the above tape with the Tentelo meter as shown below.
3. Pull up the tape as same as tape transportation speed, 83.880mm/sec.
4. Adjust the Tentelo meter so that the meter shows just one ounce.

<STEP 2>

1. Connect the Two ounce calibration weight to the D3 tape (about 30cm).
2. Set the above tape with the Tentelo meter as shown below.
3. Pull up the tape as same as tape transportation speed, 83.880mm/sec.
4. Compensates the reading value according with compensation table.



2oz. Indication	Tension specification 23±2		
	21	23	25
47	23.572	24.884	26.197
48	23.313	24.696	26.079
49	23.053	24.507	25.961
50	22.794	24.318	25.842
51	22.535	24.130	25.724
52	22.276	23.941	25.606
53	20.016	23.752	25.488
54	21.757	23.563	25.370
55	21.498	23.375	25.252
56	21.239	23.186	25.134
57	20.979	22.997	25.015
58	20.720	22.809	24.897
59	20.461	22.620	24.779
60	20.202	22.431	24.661
61	19.942	22.243	24.543
62	19.683	22.054	24.425
63	19.424	21.865	24.306
64	19.165	21.676	24.188
65	18.905	21.488	24.070
66	18.646	21.299	23.952
67	18.387	21.110	23.834



(1oz. = 28.3495g)

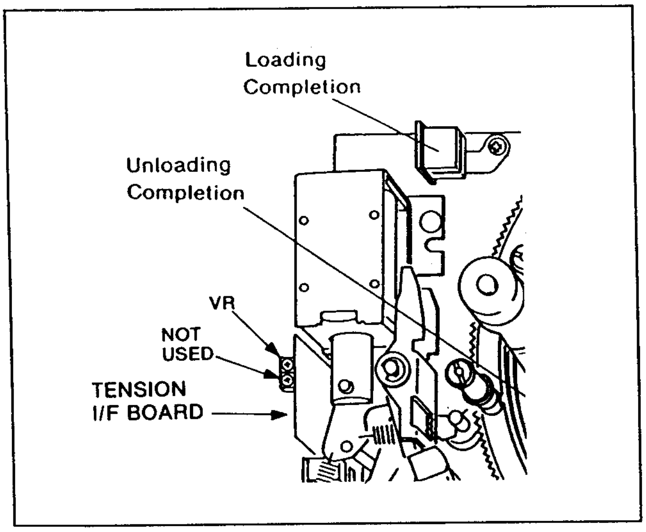
5-3. SENSOR AMP OFFSET ADJUSTMENT (S5 : SERVO)

SPEC	2.5V ± 0.1V DC
TEST	TP2201 [G4]
MODE	EJECT
TAPE	
M.EQ	DIGITAL VOLT METER
INPUT	
ADJ.	VR (on the Tension I/F P.C.B.)

<STEP 1>

1. DIGITAL VOLT METER : TP2201
2. Adjustment VR on the Tension I/F P.C.B. so that the DC voltage is 2.5V ± 0.1V DC.

SPECIFICATION = 2.5V ± 0.1V DC


Loading
Completion
Unloading
Completion
VR
NOT
USED
TENSION
I/F BOARD

5-4. SUPPLY SENSOR TENSION ADJUSTMENT

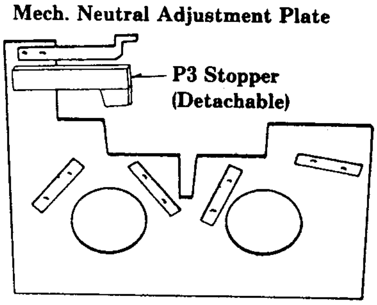
(1) Tension neutral voltage adjustment

SPEC	Sensor Output 2.5V ± 0.05V
TEST	TP2001 [G4] on S5 board
MODE	Loading Completion
ADJ.	Tension Sensor unit
TOOL	Mech Neutral Adjustment Plate (VFK0719)
	Eccentric Screwdriver (ø2) (VFK0358)

FIELD ADJUSTMENT

<STEP 1>
1. Turns power off.
2. Remove the cassette compart-ment with the connector as shown in item 2-3.
3. Turns power on.
4. Insert a M cassette into the cassette compartment for an instant. (for size delect).
5. Rotate sub-loading motor to counterclockwise manually until sub-loading completion.

<STEP 2>
1. Remove the P3 stopper from the Mech Neutral Adjustment Plate.

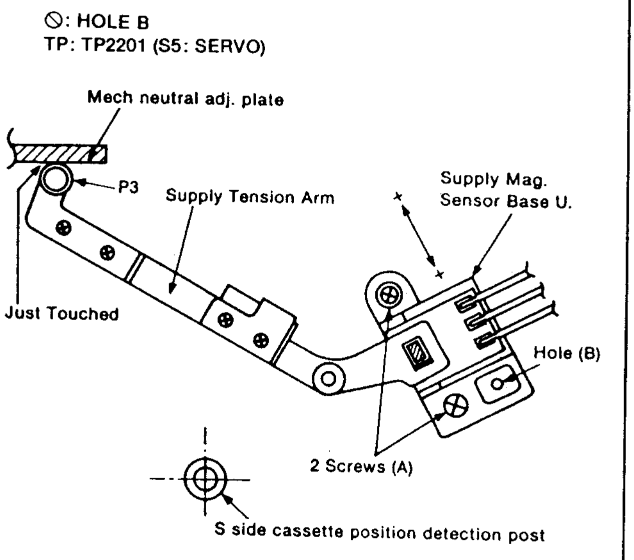


2. Set the Mech Neutral Adjust-ment Plate on the reel table correctly.
   Be careful any mechanism will not be damaged.

<STEP 3>
1. Confirm again the P3 stopper is removed from the plate.

<STEP 4>
1. Connect the scope to the sensor output.
2. Confirm that the sensor output of TP2201 is 2.5V ± 0.05V.
3. If it is not loosen two screws "a", and adjust Tension sensor unit position by a Eccentric screw driver (ϕ2mm) at hole "b".

<STEP 5>
1. The tension sensor is moved "c" direction.
2. SPECIFICATION = 2.5V ± 0.05V
3. Tighten two screws "a".
4. Return the cassette compart-ment to the original position.



FACTORY ADJUSTMENT

<STEP 1>
1. Turns power off.
2. Remove the cassette compart-ment.
3. Turns power on.
4. Set the VTR into Mech Test modeas shown below.

TEST → MECH → NO TAPE

M CASSETTE

5. Remove the P3 Stopper from the Mech Neutral Plate on the Reel Table.
6. Press STOP key to set the loading completion mode.

<STEP 2>
1. Make sure that the P3 post touches the arm of the Mechanical Neutral Plate as shown in Figure.
2. Confirm that the voltage at TP2201 is 2.5V ± 0.001V.
3. If it is not, loosen 2 screws (A) and insert the eccentric screwdriver into hole (B).
4. Adjust the position of the Supply Magnet Sensor Base Unit until the voltage at TP2201 is in specification.

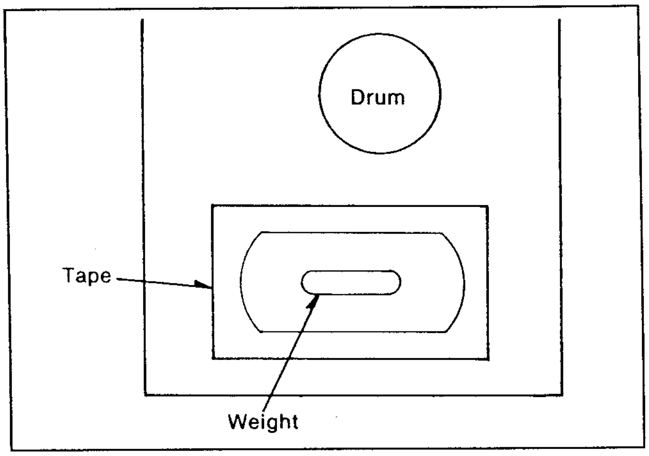
SPECIFICATION : 2.5V ± 0.015V

5. Tighten the 2 screws (A) and make sure the voltage at TP2201 does not change.

<STEP 3>
1. Place the unit in the PLAYBACK mode.
2. Confirm that the voltage at TP2201 (Vs) ± 0.002V.
3. If it is not, adjust the Supply Magnet sensor Base Unit, follow the procedure in <STEP 3>.

5-5. TAKE UP REEL TORQUE ADJUSTMENT (S5:SERVO)

SPEC.	T REEL TORQUE = 53gr.cm ± 5gr.cm
TEST	TAKE UP REEL
MODE	TAPE LOADING COMPLETION WITHOUT CASSETTE TEST MECH, NO FRLD
TAPE	SELF-RECORDING TAPE
M.EQ	DIAL TORQUE GAUGE (150g max.) -VFK71 DIAL TORQUE GAUGE ADAPTOR -VFK0134 TENTELO METER -VFK0132
INPUT	
ADJ.	FRONT PANEL ADJUSTMENT VR



<STEP 1>

1. Remove the cassette compartment.
2. Set the service switch SW1-4 ON and turn the power ON.
3. Attach the Dial Torque Gauge Adaptor with the Dial Torque Gauge and set the Dial Torque Gauge on the Take Up Reel Motor.
4. Set the VTR into test mode.

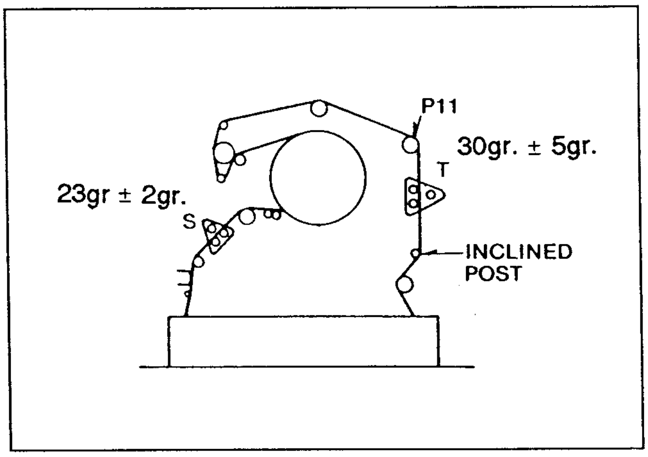
TEST → SERVO → REEL → MEASURE → S.T

5. Place the unit in the STOP mode.
6. Place the unit into the Take Up Reel Torque Adjustment mode as shown below.

TEST → SERVO → REEL → F + F3

7. Adjust Front Panel adjustment VR so that the Take Up Reel Torque is within specification.

SPECIFICATION = 53gr.cm ± 5gr.cm



<STEP 2>

1. Insert a self recording tape.
2. Set the VTR into recording mode.
3. Adjust Take Up Reel Torque so that the tension is within specification.

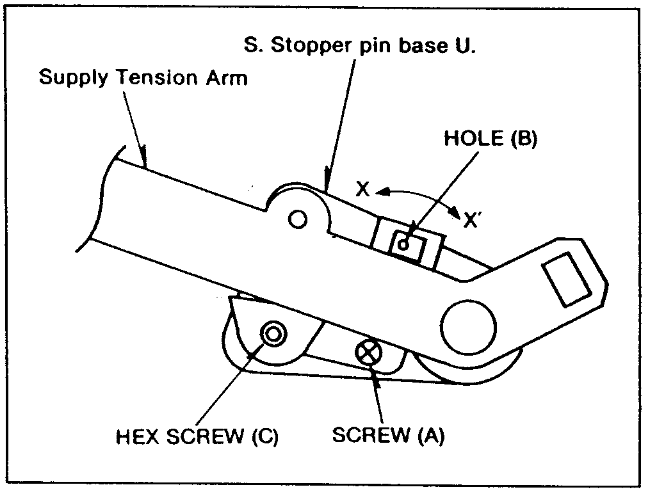
SPECIFICATION : 30gr.cm ± 5gr.cm

SW1	1	2	3	4	5	6
Factory Set	ON	ON	OFF	OFF	OFF	ON
Service Mode	ON	ON	OFF	ON	OFF	ON

Service Switch

5-6. SUPPLY REEL TORQUE ADJUSTMENT (S5:SERVO)

SPEC.	S REEL TORQUE = 45gr.cm ± 5gr.cm
TEST	SUPPLY REEL
MODE	TAPE LOADING COMPLETION WITHOUT CASSETTE TEST MECH, NO FRLD
TAPE	SELF-RECORDING TAPE
M.EQ	DIAL TORQUE GAUGE (150g max.) -VFK71 DIAL TORQUE GAUGE ADAPTOR -VFK0134 TENTELO METER -VFK0132
INPUT	
ADJ.	FRONT PANEL ADJUSTMENT VR



<STEP 1>

1. Remove the cassette compartment.
2. Set the service switch SW1-4 ON and turn the power ON.

3. Attach the Dial Torque Gauge Adaptor with the Dial Torque Gauge and set the Dial Torque gauge, on the supply Reel Motor.
4. Set the VTR into Test mode.

TEST → SERVO → REEL → MEASURE → S.T

5. Place the unit in the STOP mode.
6. Place the unit into the Supply Reel Torque adjustment mode as shown below.

TEST → F8(SERVO) → F2(REEL) → F+F2(SREEL)

7. Adjust Front Panel adjustment VR so that the Supply Reel Torque is within specification.

SPECIFICATION = 45gr.cm ± 5gr.cm

<STEP 2>

1. Insert a self recording tape.
2. Set the VTR into recording mode.
3. Adjust Supply Reel Torque so that the tension is within specification.

SPECIFICATION : 23gr.cm ± 2gr.cm (P2~P3)

4. If it is not within specification, loosen the screw (A).
5. Insert the Eccentric Screwdriver into Hole (B).
6. Adjust the position of S. Stopper Pin Base Unit so that the supply tension is 18gr ~ 25gr.
7. Insert the Hex Wrench to Hex Screw (C).
8. Adjust the position of S. Stopper Pin Base Unit so that the tension is 23 ± 2gr.
9. Tighten the screw (A), then reconfirm the tension after the screw (A) is tightened.

5-7. LOADING TORQUE ADJUSTMENT (S5:SERVO)

SPEC.	LOADING TORQUE = 60gr.cm ± 2gr.cm
TEST	TAKE UP REEL
MODE	
TAPE	
M.EQ	REEL TORQUE METER
INPUT	
ADJ.	FRONT PANEL ADJUSTMENT VR

<STEP 1>

1. Remove the cassette compartment.
2. Set the service switch SW1-4 ON and turn the power ON.
3. Attach the Dial Torque Gauge Adaptor with the Dial Torque Gauge and set the Dial Torque Gauge on the Take Up Reel Motor.
4. Set the VTR into Mechanism Test mode.

TEST → SERVO → REEL → MEASURE → L

5. Place the unit in the STOP mode.
6. Place the unit into the Take Up Reel Torque Adjustment mode as shown below.

TEST→F8(SERVO)→F2(REEL)→F + F1(LOADING)

7. Adjust Front Panel adjustment VR so that the Take Up Reel Torque is within specification.

SPECIFICATION = 60gr.cm ± 2gr.cm

5-8. SUPPLY (FWD.) TENSION ADJUSTMENT

SPEC	23g ± 2g (P2 - P3)
MODE	Tape PLAY, M cassette
ADJ.	S. STOPPED PUT BASE U
TOOL	Tentelo meter (VFK0132)
	Eccentric Driver (ø1.5) (VFK0357)
	Hex Wrench M2.6 (VFK0326 --- set)

<STEP 1>

1. Insert a M cassette.
2. Playback the tape.
3. Set the calibrated Tentelo meter between P2 and P3 post as shown in Figure.

<STEP 2>

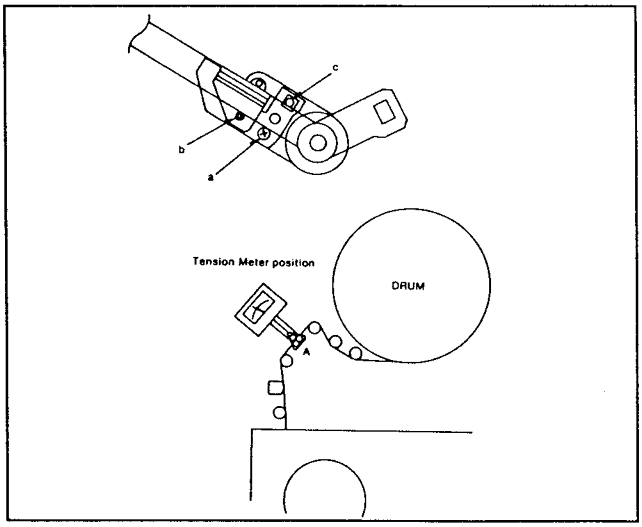
1. Confirm the tension is within specification, if it is not adjust following.
2. Loosen screw "A".
3. Set the Eccentric Driver at hole "c" and adjust the tension is within specification.
4. Tighten the screw "A".

<STEP 3>

1. Set the Hex wrench M2.6 to the Hex screw "C".
2. Adjust the tension within specification.
3. This Hex screw "C" is for fine adjustment, must be within 5g deviation.

<STEP 4>

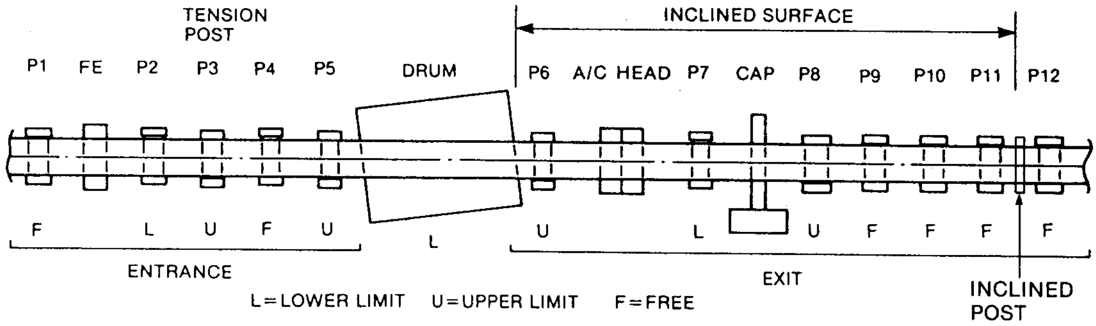
1. Place the unit STOP mode.
   (Loading completed condition)
2. SCOPE : TP2201
3. Confirm that thesensor voltage is 2.5V ± 0.25V.



TAPE TRANSPORTATION POSTS LIMIT POSITION TABLE

Name	Limit	Adjustment
P1 Post	Free	Set Free Position (Torque 2.5Kg)
P2 Post	Lower Limit	Lower Limit or Free during PLAY mode (Torque 2.5Kg)
P3 Post	Upper Limit	Confirm the Entrance side Envelope is flat (Torque 2.5Kg)
P4 Post	Free	Set the flange 1/2 CW from lower limit (Torque 2.5Kg)
P5 Post	Upper Limit	Upper Limit during PLAY mode (Torque 2.5Kg)
P6 Post	Upper Limit	Confirm EXIT side Envelope is flat (Torque 2.5Kg)
P7 Post	Lower Limit	Lower Limit during PLAY mode (Torque 2.5Kg)
P8 Post	Upper Limit	Upper Limit during ALL mode (Torque 2.5Kg)
P9 Post	Free	Free in PLAY, REV mode --- Lower Limit (Torque 2.5Kg)
P10 Post	Free	Free or Lower Limit during PLAY and REV (Torque 2.5Kg)
P11 Post	Free	Free or Lower Limit during PLAY and REV (Torque 2.5Kg)
P12 Post	Free	Set Free Position (Torque 2.5Kg)

D3 STUDIO VTR TAPE PATH LIMIT



Tape Transport

TAPE TRANSPORT CONFIRMATION

<STEP 1>
1. Play back the work tape.
2. Confirm the all post limit as shown above and conform that there is no tape damage at each posts during playback.

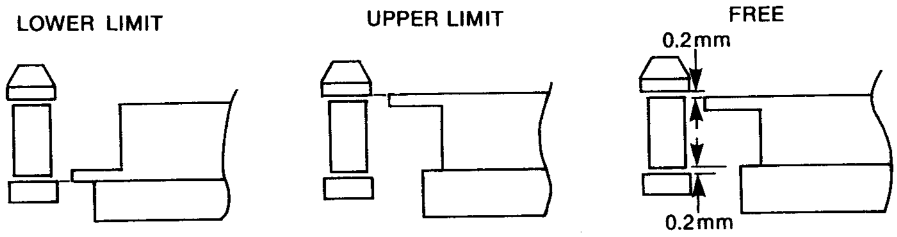
<STEP 2>
1. Confirm that the P8 post is upper limit during playback.
2. Set the VTR VAR × -1 mode.
3. Confirm that there is no tape damage at P7 lower flange portion.
4. If there is the tape damage, adjust the P9 flange so that the tape damage at P7 post lower flange portion does not occur.
5. Confirm that there is no tape damage at P9 post flange portion.

<STEP 3>
1. Set the VTR VAR × -1 ~ VAR × 3 alternately.
2. Confirm that there is no tape damage at P9, P10, P11 lower flange portion.
3. If there is the tape damage, adjust P10, P11 post flange so that the tape damage at P9, P10, P11 does not occur.

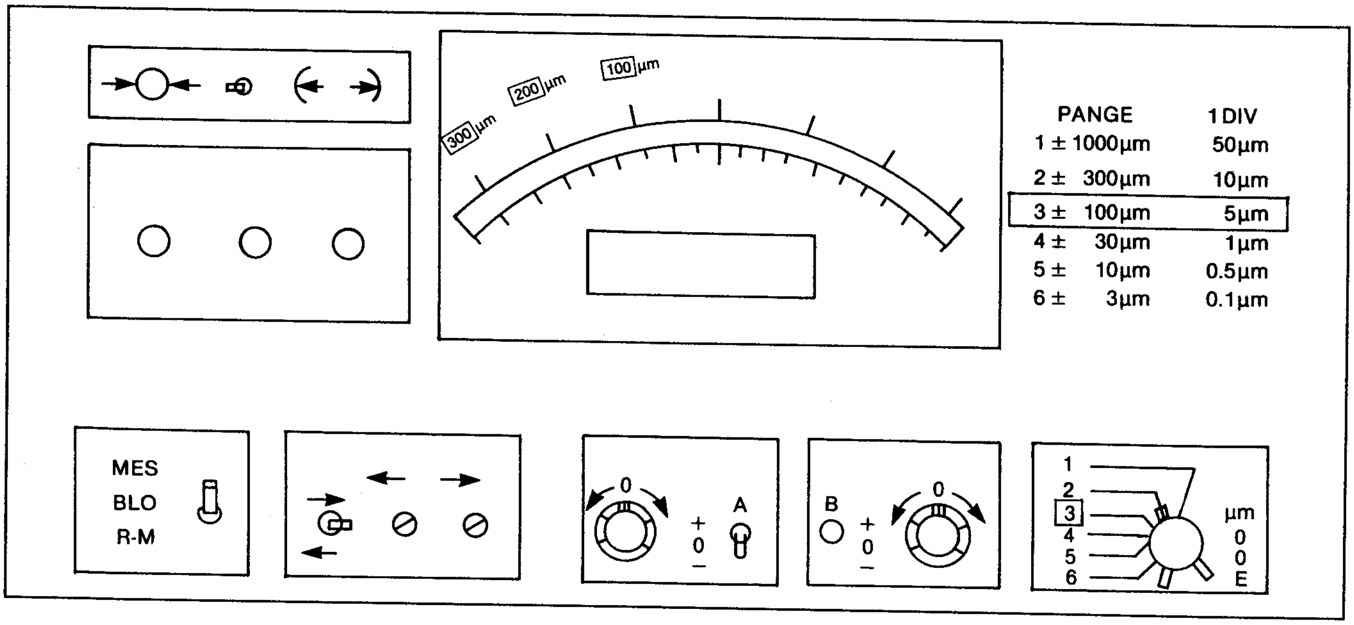
POST HEIGHT PRE-ADJUSTMENT (FACTORY ADJUSTMENT)

Basically, Post Roller is positioned to original height after replacing (as long as, the hex screw is not misadjusted). However, in order to avoid the tape damage in Loading and Unloading mode, confirm that the height of the P1, P2, P4, P5 and P12 posts are set to specified height, using MECH. Plate and height fixture.

In order to do this, remove the cassette compartment, and install the mechanical neutral adjustment plate over the reel tables. Then place the post height fixture on the Mechanical Neutral Adjustment Plate as shown in figure. (thumbscrews of neutral plate can be removed as needed). The upper and lower flanges of the P1, P2, P3, P4, P5 and P12 post should be touch the upper and lower surface of fixture as shown in figure 3-16-6. If these posts do not touch the surface, adjust the post height as needed.



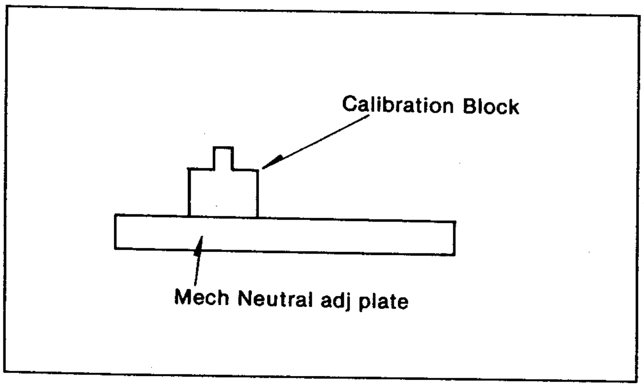
MICRO METER SETTING

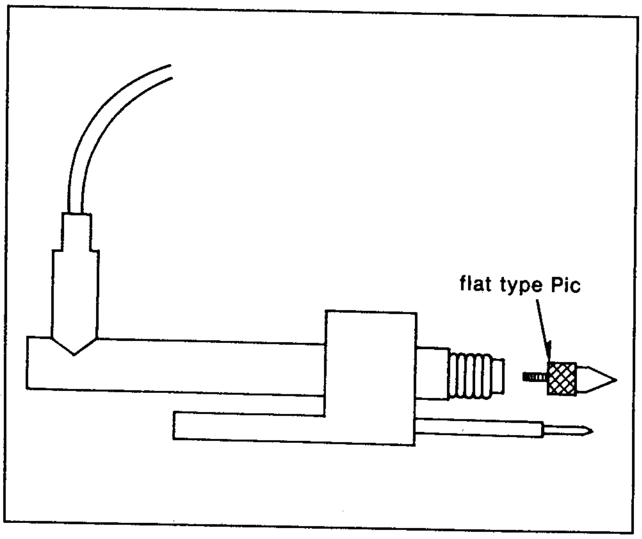

300 µm
200 µm
100 µm
PANGE
1 DIV
1 ± 1000µm 50µm
2 ± 300µm 10µm
3 ± 100µm 5µm
4 ± 30µm 1µm
5 ± 10µm 0.5µm
6 ± 3µm 0.1µm
MES
BLO
R-M
0
+
0
−
A
B
+
0
−
0
1
2
3
4
5
6
µm
0
0
E

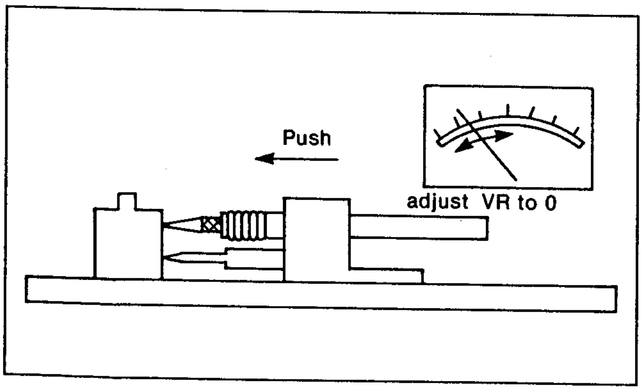
MICRO METER (TESA TTA20)

SETTING OF MICRO METER

1. Turn the power ON. (Rear panel)
2. Set the Range VR to 2. (Range ± 100µm)
3. Connect the Micro Meter Pick Up to A side on the rear panel.
4. Set the A select button to - or + side on the front panel.
5. Set the B select button to 0 side on the front panel.
6. Put the Calibration block on the Mech Neutral adjustment plate as shown in figure.
7. Change the Micro Meter gauge head pick up to flat type as shown in figure.
8. Push the Micro Meter Pick Up to Calibration block as shown in figure.
9. Adjust the VR to reference point. (0)


Calibration Block
Mech Neutral adj plate

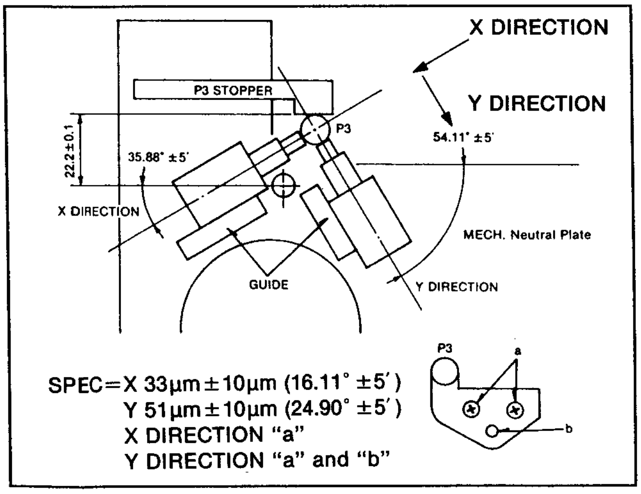

flat type Pic


Push
adjust VR to 0

5-10. P3 POST INCLINED ANGLE ADJUSTMENT (FACTORY ADJUSTMENT ONLY)

SPEC	X direction 33µm ± 10µm (16.11' ± 5') Y direction 51µm ± 10µm (24.90' ± 5')
MODE	P3 Stopper touch condition (Manual sub-loading)
TOOL	Mech. Neutral Plate with P3 stopper Micro Meter and Pick up (7mm pitch), pick up Fixture Micro Meter caliblation block

1. Turn the power off.
2. Remove the cassette compartment with the connector as shown in item 2-3.
3. Turn the power ON and insert a M cassette compartment into the cassette compartment for an instant.
4. Set the neutral plate with P3 stopper on the reel base.
5. Set the Micro Meter pick up to the pick up fixture with M3 screw.
6. Calibrate the Micro meter pick up reference position with the calibration block. (Refer to setting of Micro Meter)
7. Rotate the sub-loading motor until the P3 post (tension post) just touched with the P3 stopper.
8. Set the Micro Meter pick up to the guide (X direction) and (Y direction) and measure the angle.
9. If the angle of X and Y directon are not within specification adjust screw a and b so that the angle of X and Y direction are within specification.
10. Paint the screw a and b.

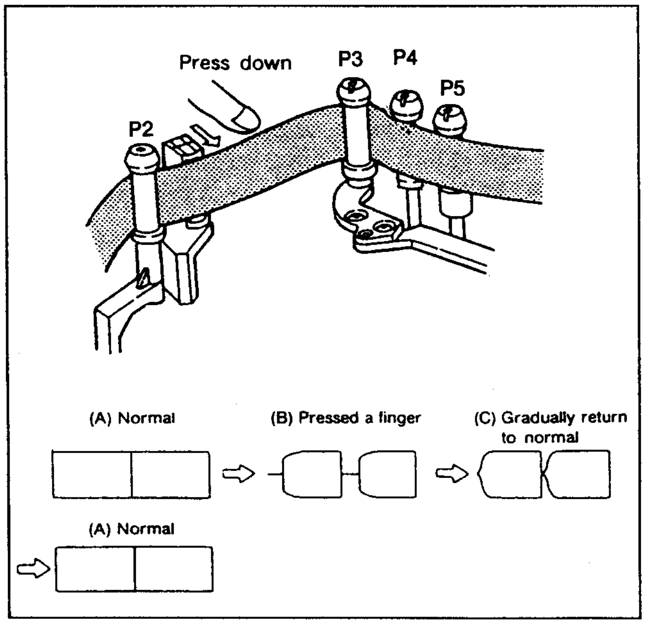


SPEC=X 33µm±10µm (16.11° ±5′)
Y 51µm±10µm (24.90° ±5′)
X DIRECTION "a"
Y DIRECTION "a" and "b"

5-11. INCLINED POST ANGLE ADJUSTMENT 1 (FACTORY ADJUSTMENT ONLY)

SPEC	0µm ± 10µm (0° ± 5')
MODE	sub-unloading completion
TOOL	Mech. Neutral Plate
	Micro Meter (7mm pitch)
	Micro Meter Pick up Fixture
	Hex. Wrench M2.6

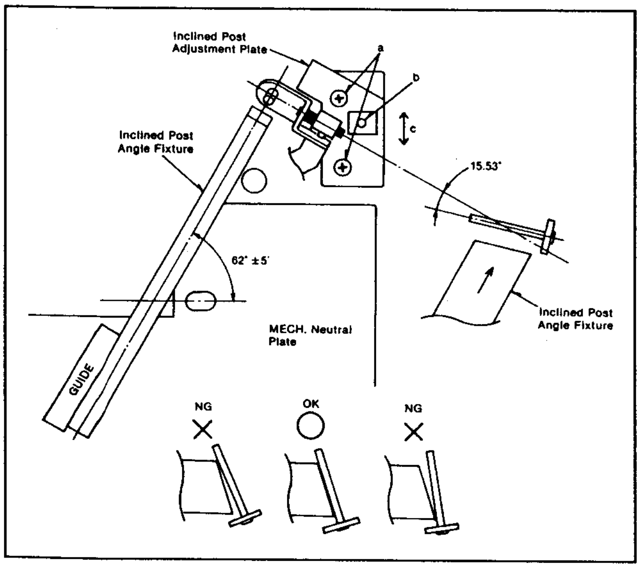
1. Turn the power off.
2. Remove the cassette compartment with the connector as shown in item 2-3.
3. Turn the power ON and insert a M cassette compartment into the cassette compartment for an instant.
4. Set the Mech. Neutral Plate on the Reel base.
5. Place the unit to unloading completion mode. (EJECT mode).
6. Calibrate the Micro Meter pick up reference position with the calibration block (Refer to setting of Micro Meter).
7. Set the Micro Meter pick up to the guide as shown in figure.
8. If the inclined post angle is not within specification adjust screw "a".
9. Paint the screw "a".



5-12. Inclined Post inclined angle adjustment 2 (Factory Adjustment only)

SPEC	Inclined Post flattely touch with the inclined
MODE	Loading Completion
TOOL	Mech. Neutral Plate without P3 stopper
	Inclined Post Inclined Angle adjustment tool
	Eccentric driver (ø2)

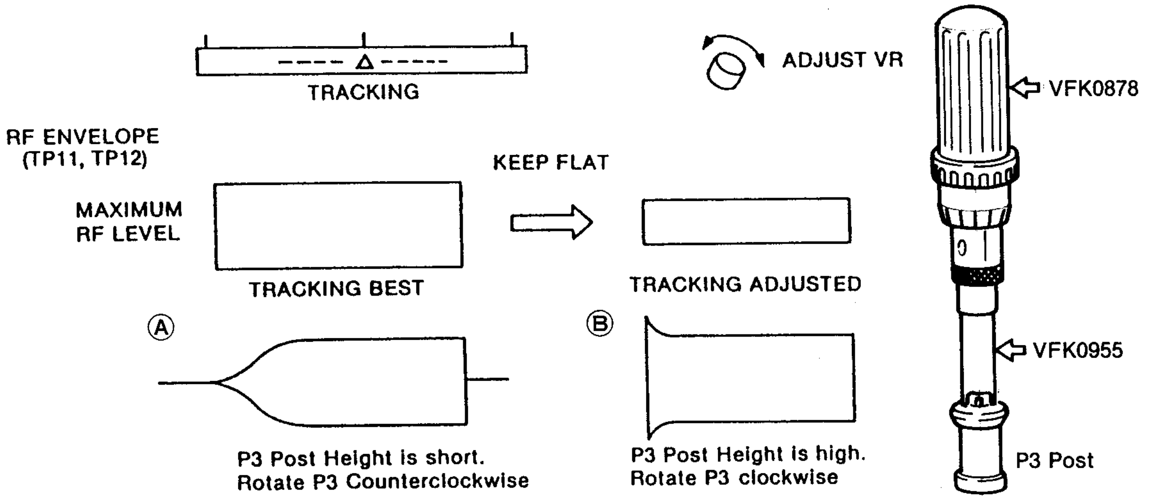
1. Turn the power off.
2. Remove the cassette compartment with the connector as shown in item 2-3.
3. Turn the power ON and insert a M cassette compartment into the cassette compartment for an instant.
4. Set the Mech. Neutral Plate on the Reel base and remove the P3 stopper.
5. Set the Mechanism to loading completion condition.
6. Calibrate the Micro Meter pick up reference position with the calibration block. (Refer to setting of Micro Meter).
7. Set the Inclined Post Inclined Angle adjustment tool as shown in figure.
8. Confirm the Inclined Post is flattely touched with the tool surface.
9. If it is not loosen screw "a" and set the eccentric driver to the hole "b".
10. Adjust the angle of the Inclined Post so that the post just touches with the tool surface.
11. Tighten screw "a".


Inclined Post Adjustment Plate
a
b
c
Inclined Post Angle Fixture
15.53°
62° ±5′
MECH. Neutral Plate
Inclined Post Angle Fixture
GUIDE
NG
OK
NG

5-13. P3 POST HEIGHT ADJUSTMENT

TEST	TP11, TP12 (REC AMP P.C.BOARD), TP37[D4](H.SW) (SERVO P.C.BOARD)
MODE	LINEAR MASTER TAPE, PLAY mode (confirmation) STOP mode (adjustment)
MACHINE CONDITION	Select the TEST MENU → Select the RF mode → Select the TRACKING mode → Set the VAR mode
SPEC	RF Envelope keeps flat when the tracking VR is adjusted
TOOL	POST DRIVER VFK0293, VFK0910, VFK0912, VFK0878 and VFK0955

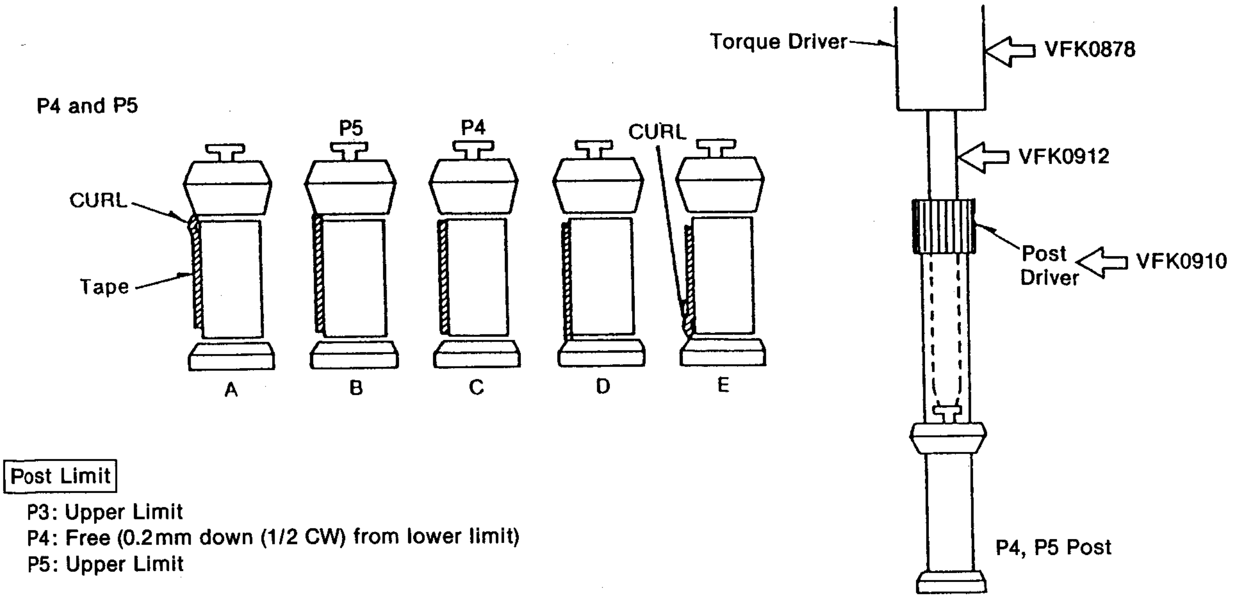
1. If the tape curling occurs at the tape path, place the unit in the STOP mode to protect for tape damage and re-adjust the post height.
2. Set the adjustable torque driver (VFK0878) to 2.5Kg.
3. Set the P4 and P5 to no limit (Free) by using VFK0910, VFK0912, and VFK0878 (post driver with adjustable torque driver).
4. Adjust P3 post by using VFK0293.
5. Confirm that the RF envelope keep flat when the tracking VR is adjusted in PLAY mode.
6. Tighten the upper flange (with 2.5Kg torque) of P3 by using torque driver and VFK0955.
7. After adjustment of P3 post, set the P4 and P5 to original limit. Be sure no curl there is on the tape.
8. Still out of specification check the P3 post Inclined angle adjustment.


TRACKING
ADJUST VR
VFK0878
RF ENVELOPE (TP11, TP12)
KEEP FLAT
MAXIMUM RF LEVEL
TRACKING BEST
TRACKING ADJUSTED
Ⓐ
Ⓑ
VFK0955
P3 Post

P3 Post Height is short.
Rotate P3 Counterclockwise

P3 Post Height is high.
Rotate P3 clockwise

*When tighten the P4 and P5 posts, torque value is 2.5Kg by using the torque driver.


Torque Driver
VFK0878
P4 and P5
P5
P4
CURL
CURL
Tape
A
B
C
D
E
VFK0912
Post Driver
VFK0910
P4, P5 Post

Post Limit

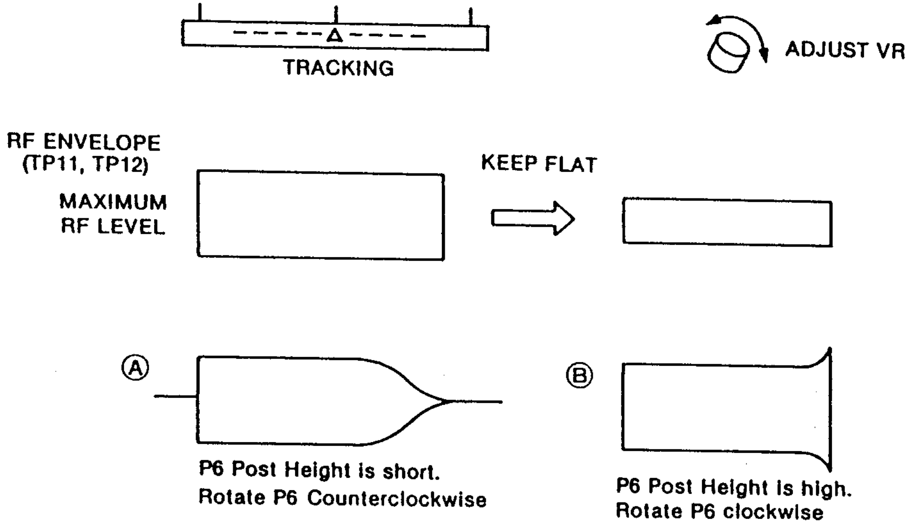
P3: Upper Limit
P4: Free (0.2mm down (1/2 CW) from lower limit)
P5: Upper Limit

5-14. P6 POST HEIGHT ADJUSTMENT

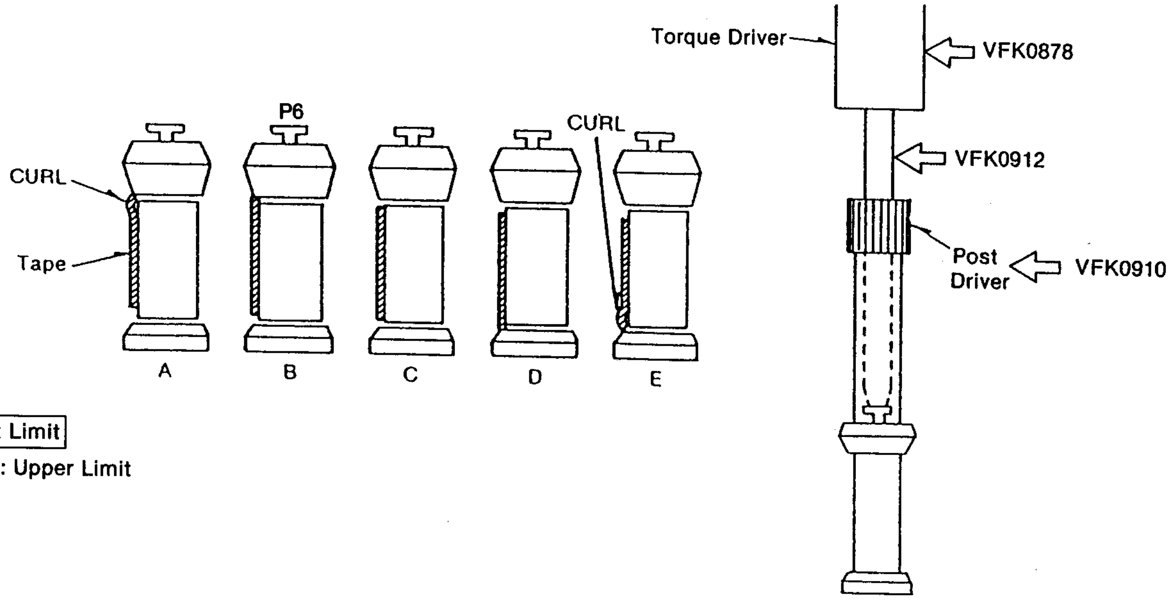
TEST	TP11, TP12 (REC AMP P.C.BOARD), TP37[D4](H.SW) (SERVO P.C.BOARD)
MODE	Alignment tape (2) LINEAR portion, PLAY mode (confirmation) STOP mode (adjustment)
MACHINE CONDITION	Select the TEST MENU → Select the RF mode → Select the TRACKING mode → Set the VAR mode
SPEC	RF Envelope keeps flat when the tracking VR is adjusted
TOOL	POST DRIVER (VFK0293) → VFK0910, VFK0912 and VFK0878

1. Set the variable torque driver to 2.5Kg.
2. Adjust P6 post by using VFK0910, VFK0912 and VFK0878 (post driver with adjustable torque driver).

Note: If it is out of specification, confirm the A/C Head tilt adjustment.


TRACKING
ADJUST VR
RF ENVELOPE (TP11, TP12)
MAXIMUM RF LEVEL
KEEP FLAT
Ⓐ
Ⓑ
P6 Post Height is short.
Rotate P6 Counterclockwise
P6 Post Height is high.
Rotate P6 clockwise

*When tighten the P6 post, torque value is 2.5Kg by using into torque driver.


Torque Driver
VFK0878
VFK0912
Post Driver
VFK0910
P6
CURL
CURL
Tape
A
B
C
D
E

Post Limit

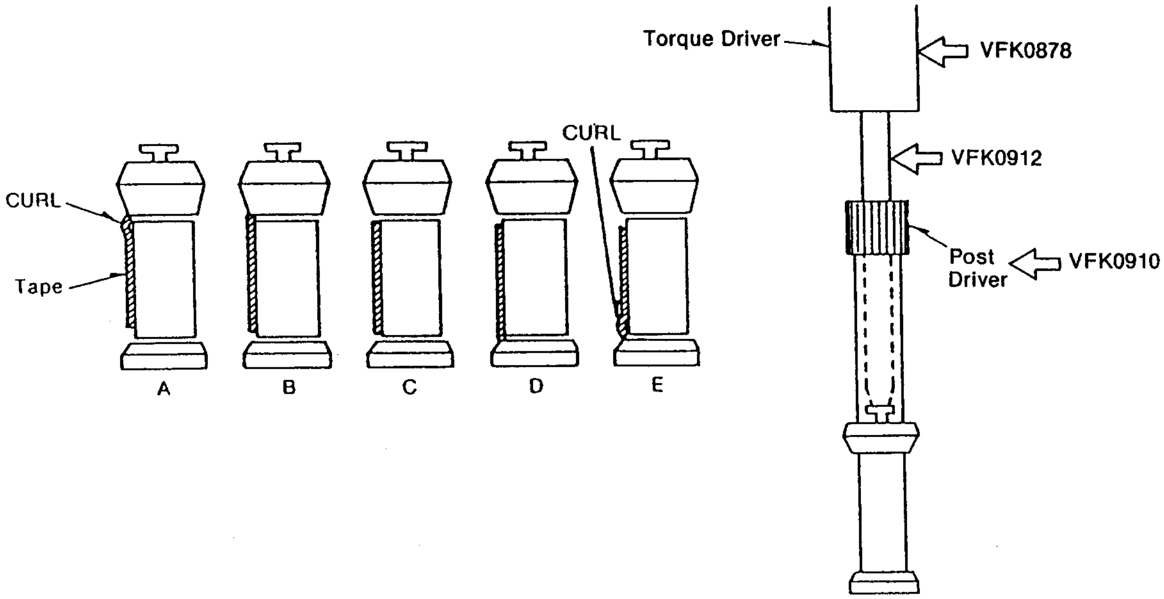
P6: Upper Limit

5-15. P7, P8, P9, P10 AND P11 POST HEIGHT ADJUSTMENT

	LIMIT (PLAY mode)	TAPE HEIGHT					ADJUSTMENT
		A	B	C	D	E	
P7 POST	Lower Limit				O		Just press lower limit without Tape curl.
P8 POST	Upper Limit		O				Just touch upper flange.
P9 POST	Free (or Upper Limit or Lower Limit)		O	O	O		Set SHTL ×-1. Adjust P9 post so that tape curl does not appear at P7 lower flange.
P10,P11 POST	Free (or Upper Limit or Lower Limit)		O	O	O		Alternately set SHTL ×3 and ×-1, adjust P10 and P11 so that the tape curl will not appear P9, P10, P11 pots.

TAPE	Self Recording Tape
MODE	Play, SHTL mode
TOOL	POST DRIVER, DENTAL MIRROR

* When tighten the each posts, torque value is 2.5Kg by using the torque driver.


Torque Driver
VFK0878
CURL
VFK0912
CURL
Tape
Post Driver
VFK0910
A
B
C
D
E

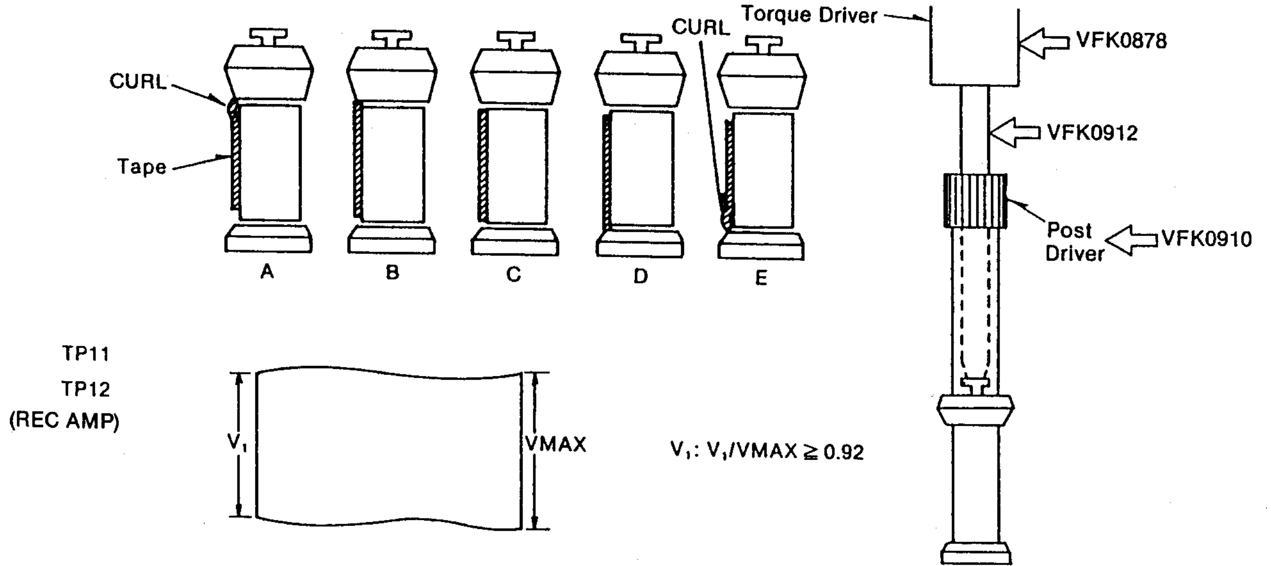
5-16. P4, P5 POST HEIGHT ADJUSTMENT

	LIMIT (PLAY mode)	TAPE HEIGHT					ADJUSTMENT
		A	B	C	D	E	
P4 POST	Free			O			Adjust P4 post to free.
P5 POST	Upper Limit		O				Just press upper limit without Tape curl.

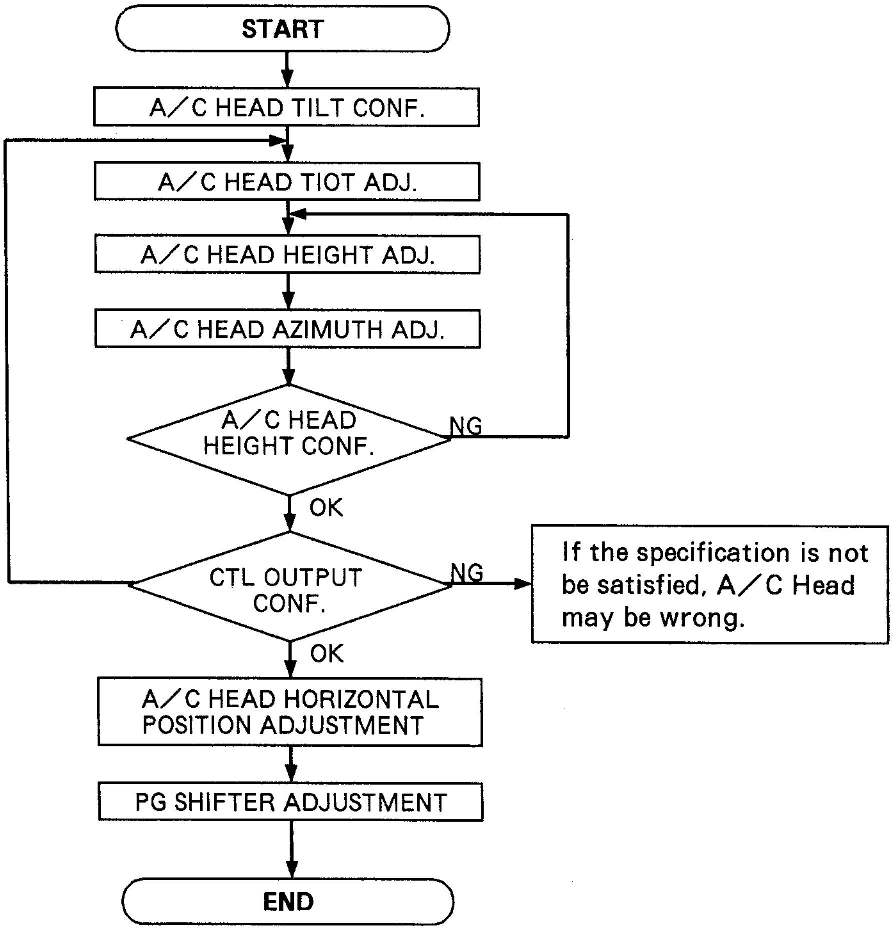
TAPE	TP11, TP12 (REC AMP BOARD), TP37 (H.SW)(SERVO BOARD)
SPEC	Output envelope is flat
MODE	LINIEAR MASTER PLAY (P4, P5 Post)
TOOL	Post Driver, Dental Mirror (VFK0878, VFK0912 and VFK0910)

1. Set the VTR to VAR ×-1 and VAR ×3 alternately and confirm that the tape curling at lower and upper flange on the P2 and P3 post are not appeared.
2. Set the VTR to FF and REW mode alternately and confirm that the tape curling at lower and upper flange on the P2 and P3 post are not appeared.
3. If appear the tape curling, adjust the P5 post height so that the tape curling is disappeared on the each modes (VAR ×-1 to VAR ×3 / FF and REW)

* When tighten the each posts, torque value is 2.5 Kg by using the torque driver.


CURL
Tape
A
B
C
D
CURL
E
Torque Driver
VFK0878
VFK0912
Post Driver
VFK0910
TP11
TP12
(REC AMP)
V_1
VMAX
V_1: $V_1/VMAX \geqq 0.92$

5-17. A/C HEAD ADJUSTMENT FLOW CHART


START
A/C HEAD TILT CONF.
A/C HEAD TIOT ADJ.
A/C HEAD HEIGHT ADJ.
A/C HEAD AZIMUTH ADJ.
A/C HEAD HEIGHT CONF.
NG
OK
CTL OUTPUT CONF.
NG
OK
A/C HEAD HORIZONTAL POSITION ADJUSTMENT
PG SHIFTER ADJUSTMENT
END

If the specification is not be satisfied, A/C Head may be wrong.

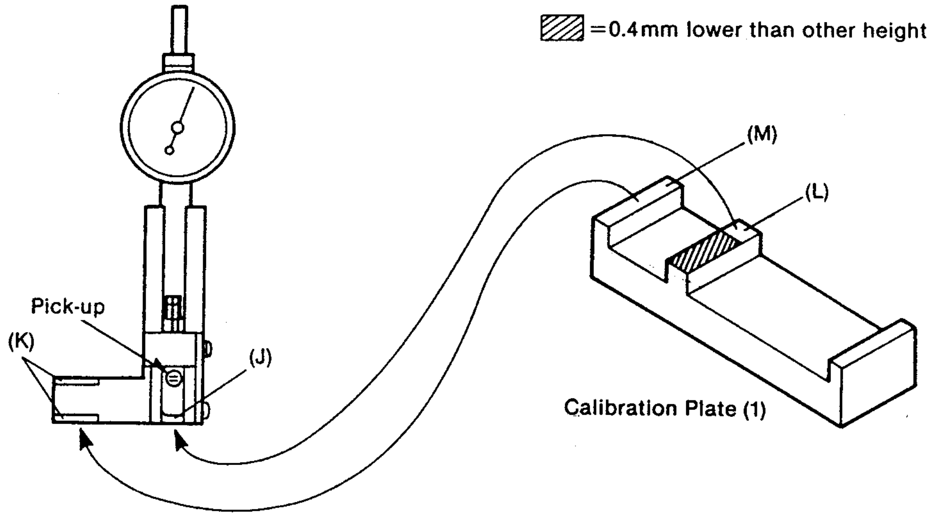
5-17-1. A/C HEAD TILT CONFIRMATION

Before adjust A/C Head Tilt, please confirm A/C Head tilt using tilt tool. This Tool is for coarse check of A/C Head tilt, therefore final confirmation is necessary checking with cue audio level, CTL pulse level and RF envelope.

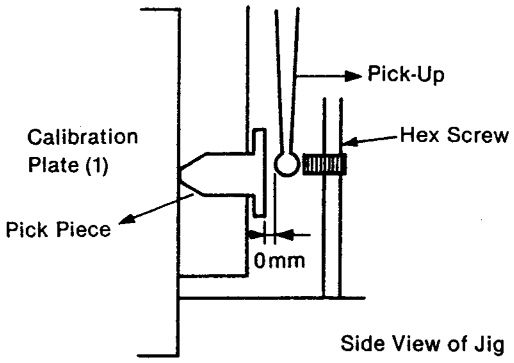
Tool List: A/C Head Tilt Tool (VFK1008)
Calibration Plate (1)(VFK1007)
Calibration Plate (2)(VFK1006)

1. CALIBRATION PROCEDURE

1) Attach the calibration Plate (1) to the A/C Head Tilt Tool as shown below.
J and L, K and M should touch each other.

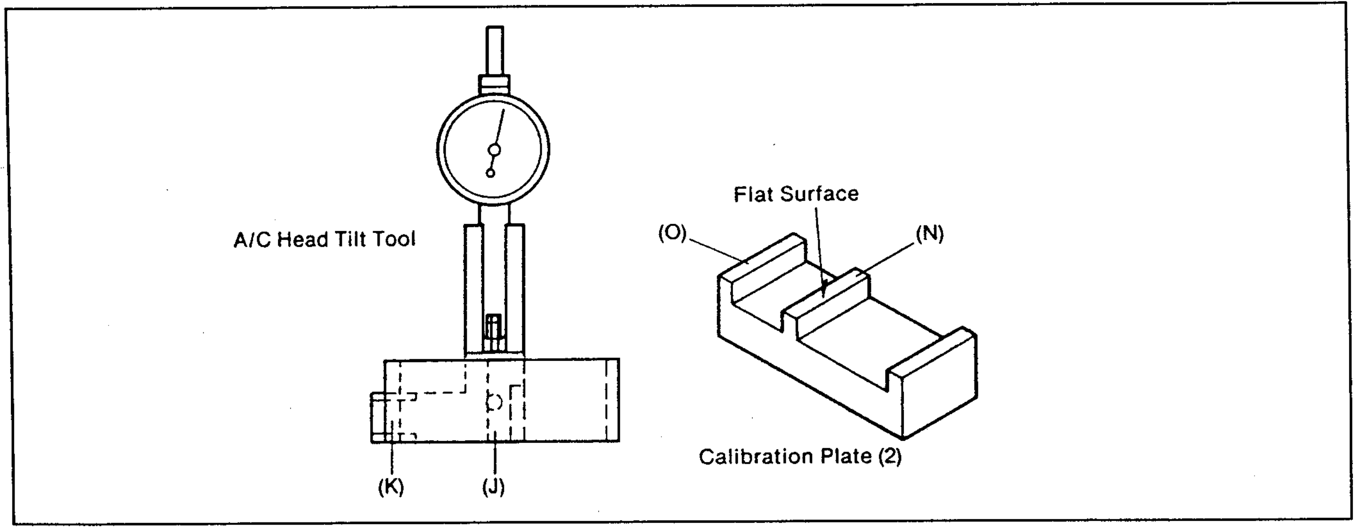

▨ =0.4mm lower than other height
(M)
(L)
Pick-up
(K)
(J)
Calibration Plate (1)

2) Gently press the Pick Piece of A/C Head Tilt Tool from rear side so that the pick piece is protruded from reference surface about 0.4mm with calibration plate (1) as shown below.


Pick-Up
Calibration Plate (1)
Hex Screw
Pick Piece
0mm
Side View of Jig

3) Turn the Hex screw clockwise so that the Pick-up touches the Pick-piece slightly. Then turn the Hex screw two turn counterclockwise.

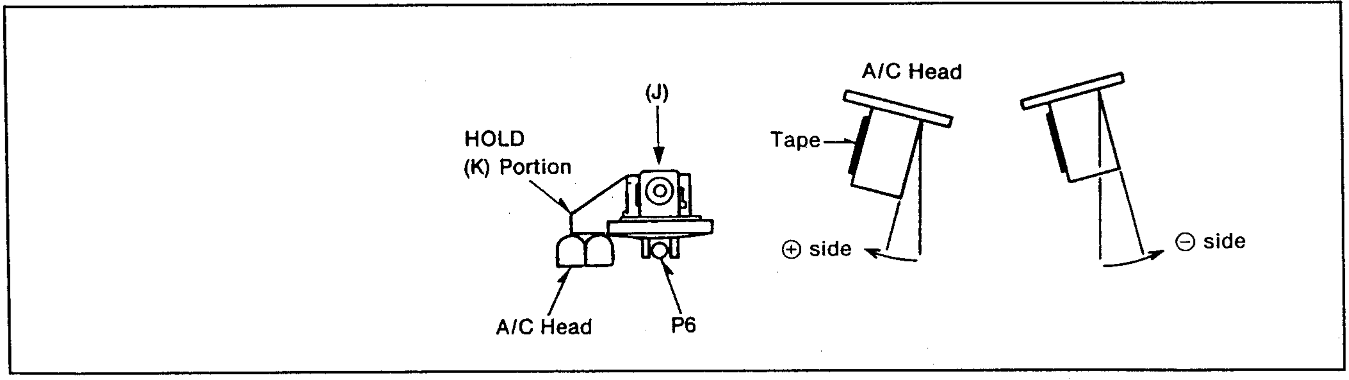
4) Attach calibration plate (2) to the A/C Head Tilt Tool as shown below.
J and N, K and O should touch.


A/C Head Tilt Tool
Flat Surface
(O)
(N)
(K)
(J)
Calibration Plate (2)

5) Hold (K) portion and gently press at (J) to set the dial gauge reading to "0".
6) Remove the Calibration Plate (2) and confirm that the gauge reading is -300μ ~ -500μ with no pressure.
7) If it is not, repeat step 1) ~ 5) until gauge reading is -300μ ~ -500μ.

2. MEASURING PROCEDURE

1) Gently install the A/C head Tilt Tool onto the P6 Post.


(J)
HOLD
(K) Portion
A/C Head
P6
A/C Head
Tape
⊕ side
⊖ side

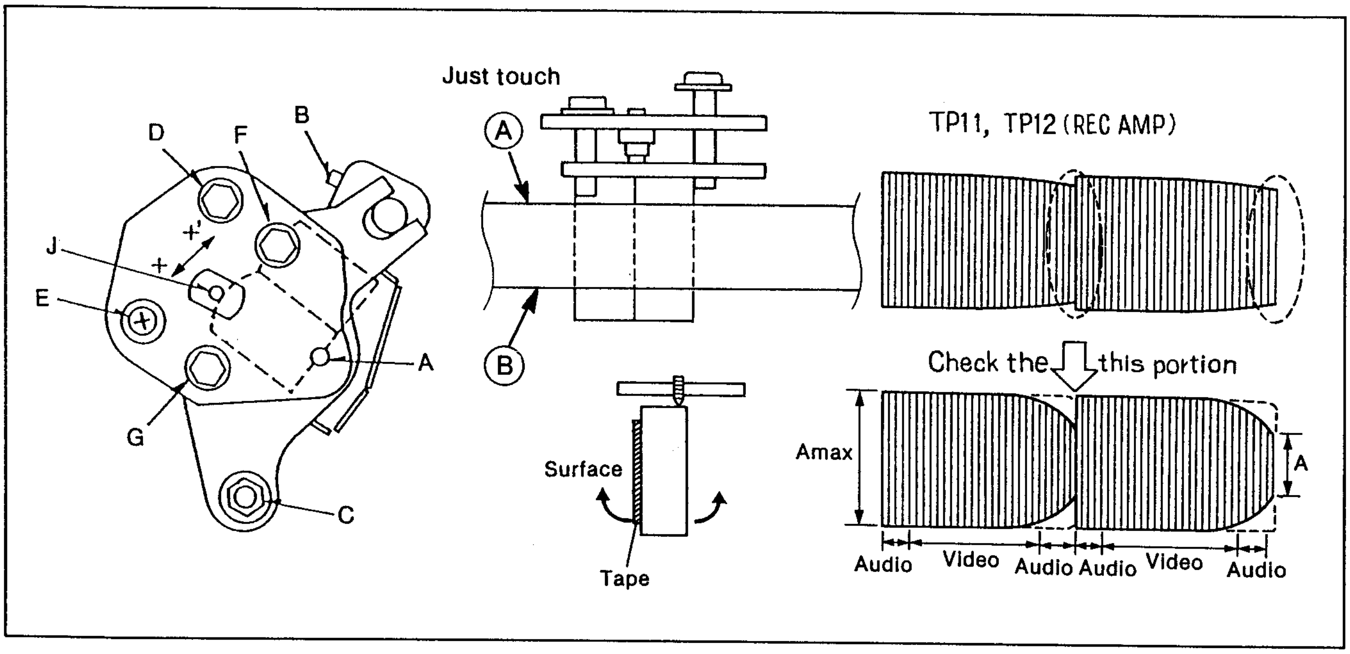
2) Hold (K) portion as reference and getly press (J) portion to measure tilt reading.
3) Confirm that the gauge reading is 0 ~ -50μm.
4) If it is not refer to the following A/C Head Adjustment Procedure.

5-18. A/C HEAD TILT ADJUSTMENT

SPEC	$A/A_{max} \geq 0.95$ $V_1/V \geq 0.95$
MODE	Alignment Tape (2) Linear portion, Cue 15KHz portion
TEST	TP20 (CTL pulse) Servo Board, TP11 or TP12 on Rec Amp Board, CUE OUT (Rear)
ADJUST	HEX screw A

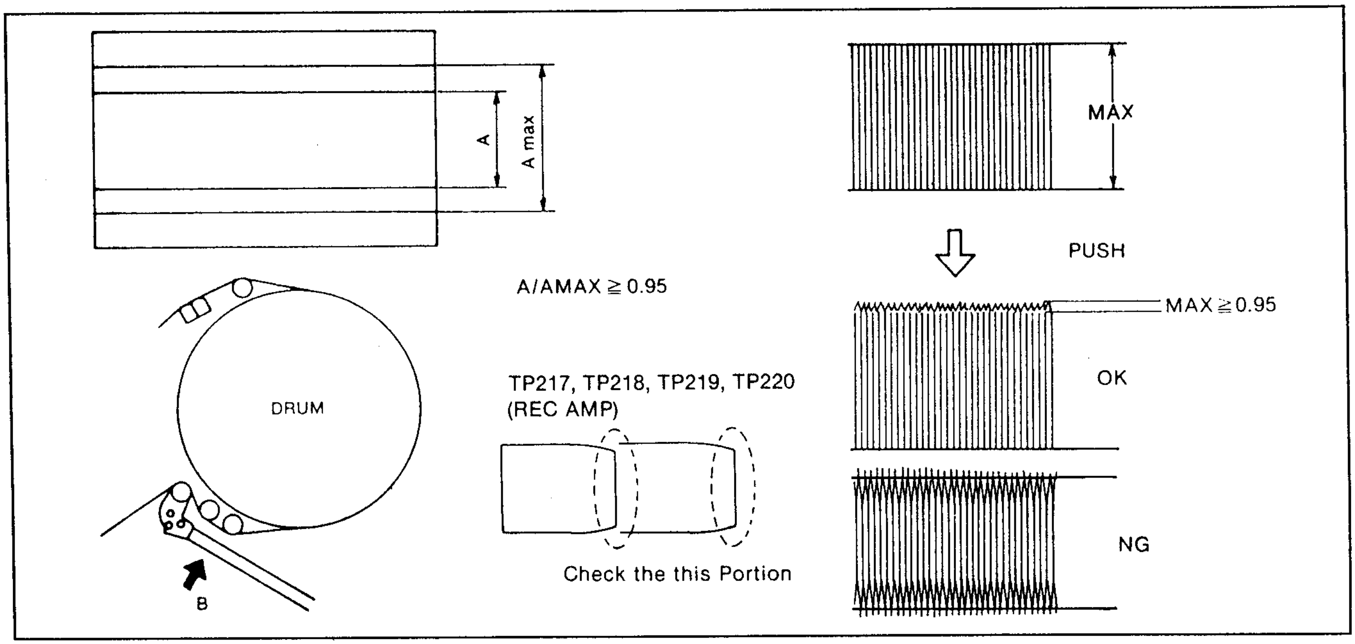
<STEP 1>

1. Playback the Alignment tape Linear portion and confirm the RF envelope at TP11 and PT12.
2. Confirm that the RF envelope has no droop or waving on exit side.
3. If droop or waving occur, adjust hex screw A or P6 post height.


D
F
B
J
E
G
C
A
+'
+
Just touch
Ⓐ
Ⓑ
Surface
Tape
TP11, TP12 (REC AMP)
Check the this portion
Amax
A
Audio
Video
Audio
Audio
Video
Audio

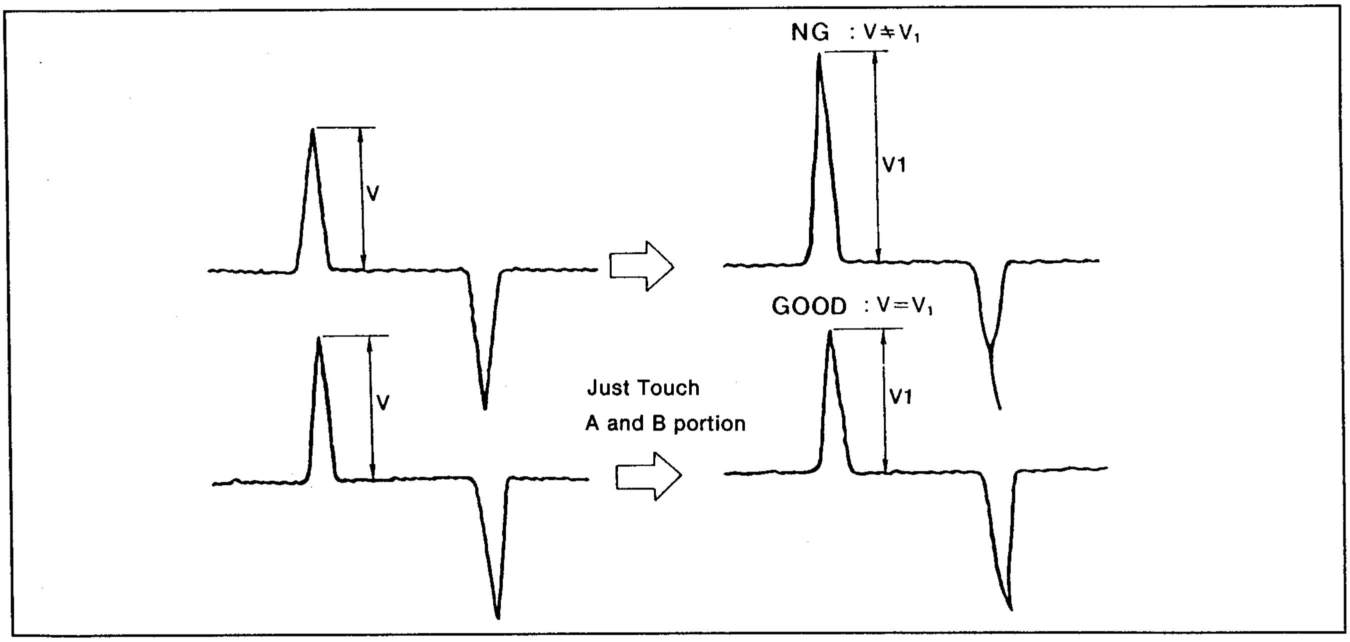
<STEP 2>

1. Playback the cue 15KHz portion and verify the audio level.
2. Tap the supply tension arm and confirm that the audio level and CTL level are maximum.
3. If not, readjust hex screw A.


A
A max
A/AMAX ≧ 0.95
DRUM
B
TP217, TP218, TP219, TP220
(REC AMP)
Check the this Portion
MAX
PUSH
MAX ≧ 0.95
OK
NG

<STEP 3> Height Confirmation

1. Playback the Linear portion and confirm the CTL level.
2. Gently press the A and B portion of the tape.
3. If CTL level will be increased, loosen the hex screw B and readjust the nut C.

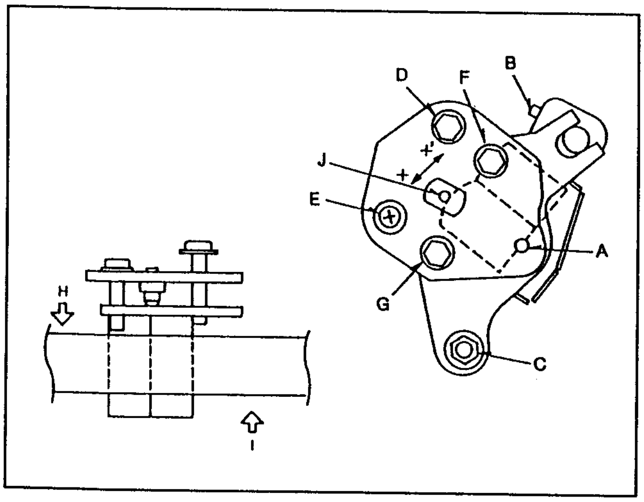

NG : V≠V1
V
V1
GOOD : V=V1
V
V1
Just Touch
A and B portion

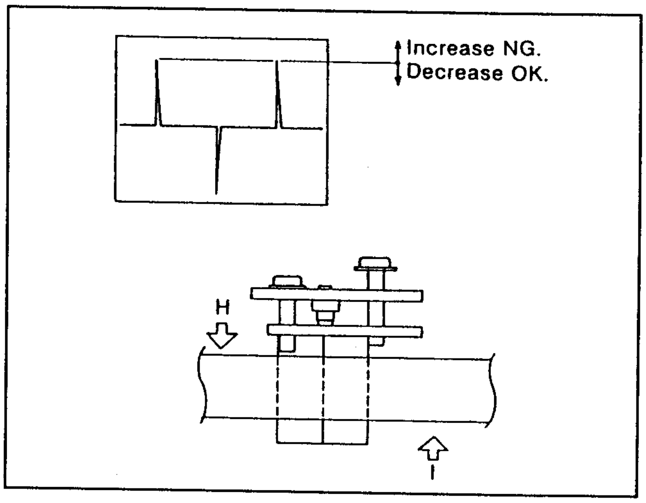
5-19. A/C HEAD HEIGHT ADJUSTMENT

SPEC	CTL Output Level is maximum
MODE	Alignment Tape (2) 15KHz portion Playback
TEST	TP20 on S5 (SERVO) Board CUE Audio Output
CONFIRM	Press tape H and I direction and confirm the audio level is decreased
TOOL	HEX Wrench M3, NUT DRIVER M4
M.EQ	Oscilloscope

<Step 1>

1. Connect scope CH1 : TP20 on S5 (SERVO) Board
   CH2 : Cue Audio Output
2. Loosen screw "B" slightly.
3. Press tape gently "H" and "I" direction.
4. If the CH1 (CTL) level increase "H" direction, rotate screw "C" counterclockwise.
5. If the CH1 (CTL) level increase "I" direction, rotate screw "C" clockwise.
6. Confirm the CUE Audio level using same procedure of CTL level.
7. Tighten screw "B".



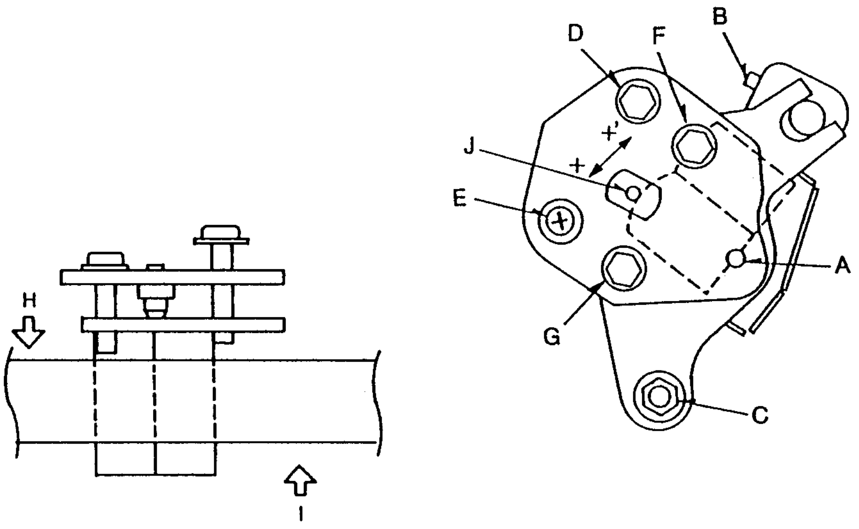


5-20. A/C HEAD AZIMUTH ADJUSTMENT

SPEC	Cue Audio Output is maximum
MODE	Alignment Tape (2) cue 15KHz portion Playback
TEST	Cue Audio Output
ADJUST	SCREW "D", SCREW "E"

<Step 1>

1. Connect scope to Cue audio output.
2. Loosen Screw "E" about 1/4 turn ccw.
3. Playback the Cue Audio Master tape.
4. Adjust the screw "D" so that the Cue audio level is maximum.
5. Tighten the 2 screws "E" and "D" alternately keeping the cue audio level is maximum and finally tighten up the screw "E" to 4Kg by using the torque driver.

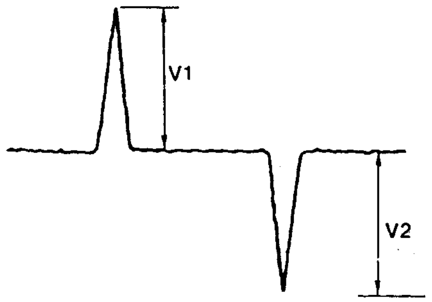


5-21. CTL OUTPUT CONFIRMATION

SPEC	$V_1 \geq 5$ [V] $V_2 \geq 5$ [V]
MODE	Alignment Tape (2) Linear Portion, Cue 15KHz Portion
TEST	TP20 (CTL pulse) Servo Board

<STEP 1>

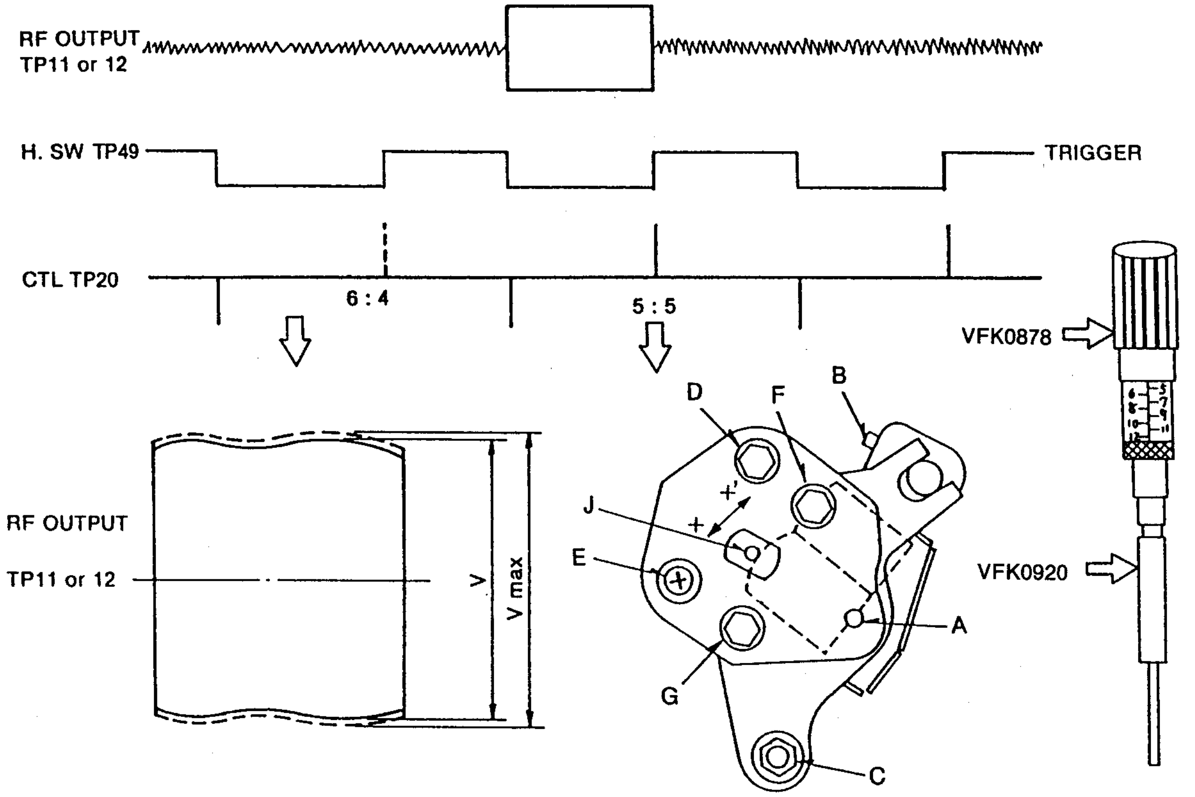
1. Confirm the CTL pulse level is more than 5V.
2. If it is not, readjust A/C Head Tilt, Height and Azimuth.



5-22. A/C Head Horizontal Position Coarse Adjustment

SPEC	RF Envelope, Head SW and CTL relationship is shown in Fig.
	V2/Vmax ≥ 0.95 (Fig. B)
TAPE	A/C Head Horizontal Position Master Tape
	Alignment No.2 Linearity Portion
MODE	PLAY mode, Tracking VR Fix
TEST	REC AMP TP11 or TP12 (RF)
	S5 SERVO TP20 (CTL) [H1], TP49 (HEAD SW)
ADJ.	A/C Head Screw "F" and "G", Hole "J" (Torque 5Kg ± 1Kg)
TOOL	Eccentric Driver (ø2) VFK0358, VFK0878 and VFK0920

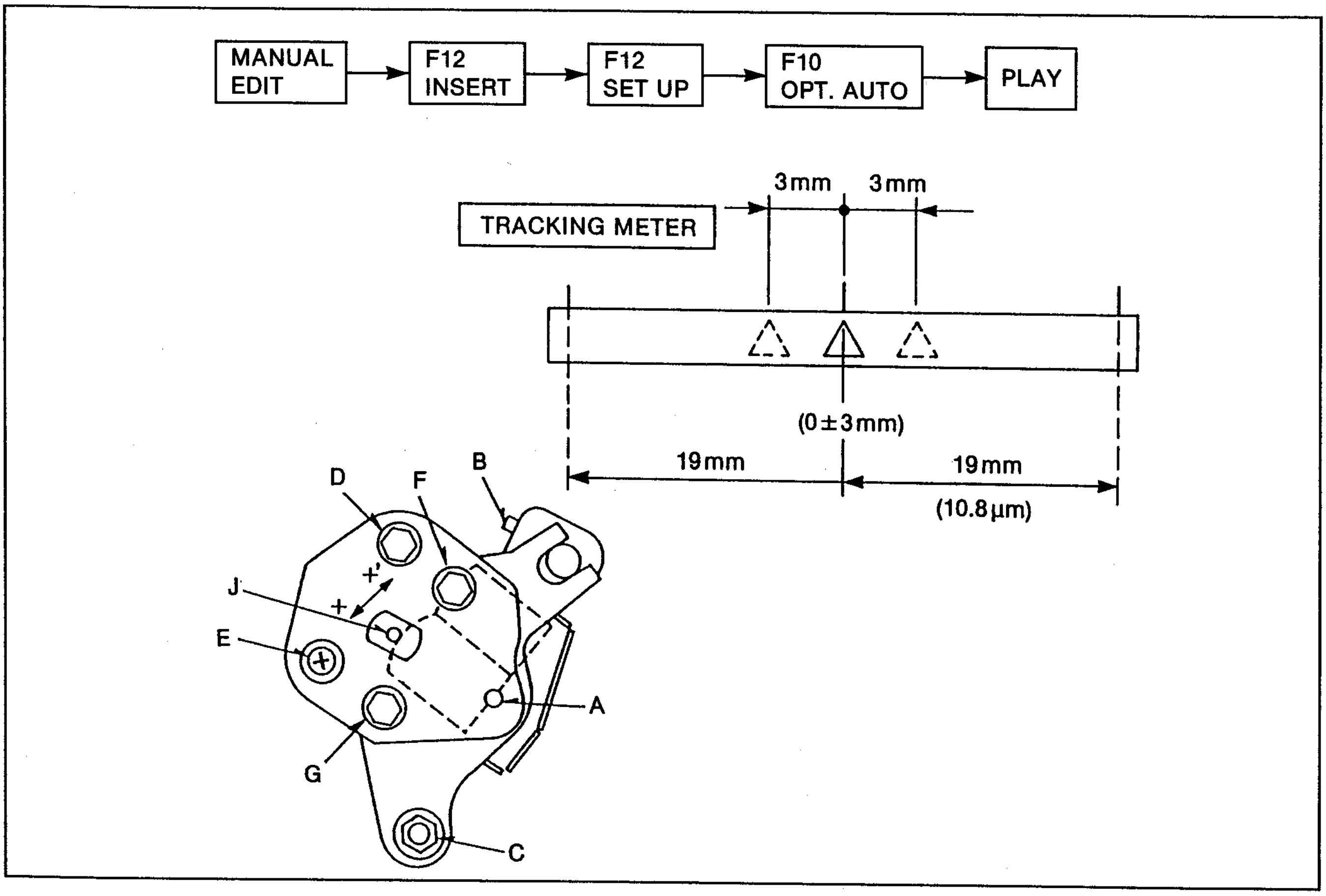
*Set the variable torque driver (VFK0878) to 5 Kg and tighten 2 screws (F) and (G).


RF OUTPUT
TP11 or 12
H. SW TP49
TRIGGER
CTL TP20
6 : 4
5 : 5
VFK0878
B
D
F
J
E
A
G
C
+'
+
VFK0920
RF OUTPUT
TP11 or 12
V
V max

5-23. A/C Head Horizontal Position Fine Adjustment

SPEC	0 ± 2µm (0 ± 3mm on the Tracking display)
MODE	Alignment tape No.2 (Color Bar Shuffling OFF portion)
ADJ.	A/C Head Screw "F" and "G", Hole "J" (Torque 5Kg ± 1Kg)
TOOL	Eccentric Driver (ø2), VFK0358, VFK0878 and VFK0920

1. Insert the Alignment tape No.2 (Color Bar Portion).
2. Set the machine condition as follows.
   MANUAL EDIT → F2 INSERT → F12 SETUP → F10 OPT AUTO
3. Press the PLAY button.
4. Confirm that the tracking meter include ± 2µm (±3mm) as shown in Figure.
5. If not, readjust the A/C Head horizontal position.

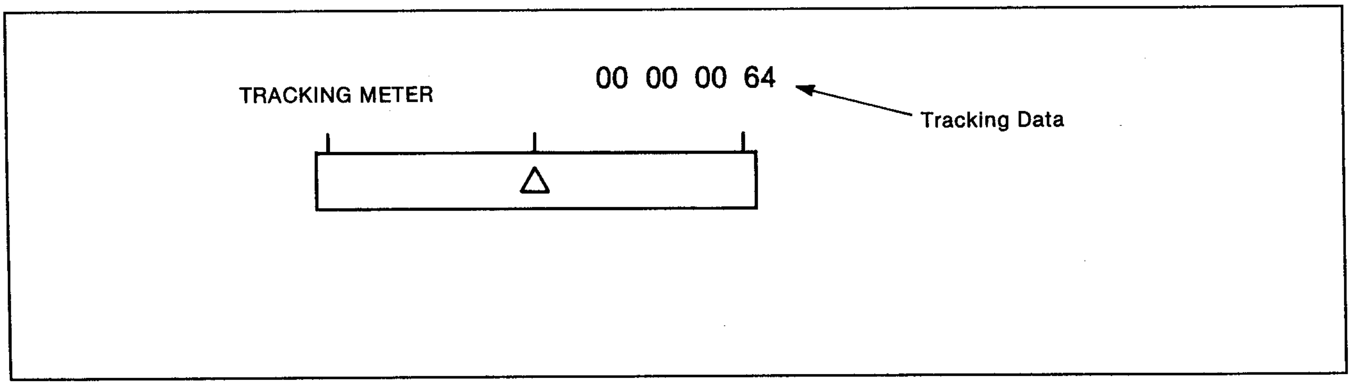

MANUAL EDIT
F12 INSERT
F12 SET UP
F10 OPT. AUTO
PLAY
TRACKING METER
3mm
3mm
(0±3mm)
19mm
19mm
(10.8µm)
D
F
B
J
E
+'
+
A
G
C

5-24. FINAL CONFIRMATION OF TRACKING OPTIMIZE

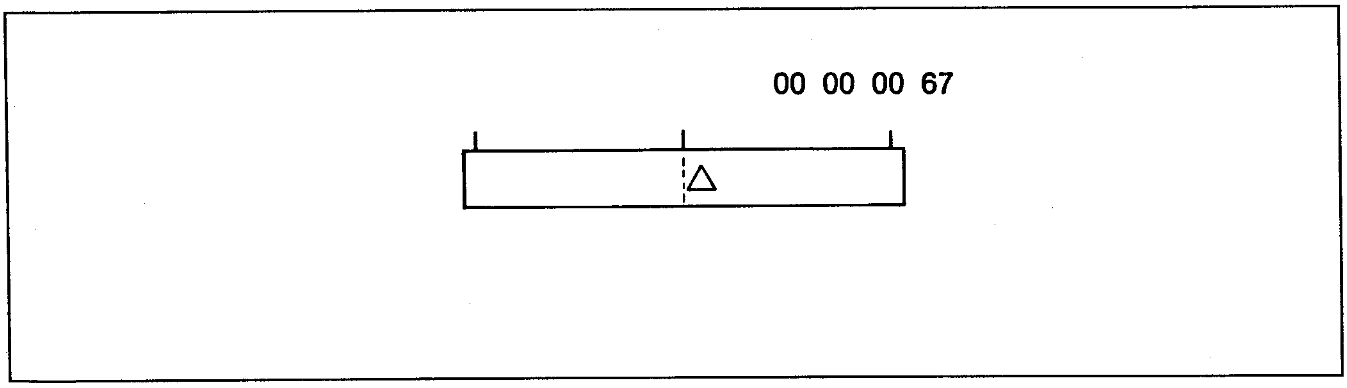
SPEC	0 ± 2µm (0 ± 3mm on the Tracking Display)(64 ± 11 at Tracking Data Display)
MODE	Alignment tape No.2 (Color Bar Shuffling OFF portion)
ADJ.	A/C Head Screw "F" and "G", Hole "J"
TOOL	Eccentric Driver (ø2), VFK0358, VFK0878 and VFK0920

After adjusted the A/C Head Horizontal position (refer to 5-23) Please confirm exact position of A/C Head as follows.

1. Set the Service SW1-4 to ON on the front back panel.
2. Set the VTR to Tracking Data Monitoring mode as follows.
   HOME MENU F8 UB → MANUAL EDIT F2 INSERT → F12 SET UP → F10 OPT ONCE or OPT AUTO.
3. During monitoring mode, Tracking data will be appeared at T/C position instead of T/C data as follows.



4. Insert the alignment tape No.2 (color bar shuffling OFF).
5. Press READY and PLAY button at same time.
6. Hight speed optimizing in progress.
7. After completed, display indicate tracking data as follows.
8. Read the indicated data at T/C position.



9. Repeat tracking optimize 2 ~ 3 times and get a average data.
10. If out of specification (64 ± 11µm) readjust A/C Head Horizontal position precisely.

5-25. PG SHIFTER ADJUSTMENT (S5:SERVO)

SPEC	PAL: 25.5 ± 0.5sec, NTSC: 27.0 ± 0.5µsec
TEST	TP11 (REC AMP), TP37 (SERVO)
MODE	PLAY
TAPE	75% Color Bar Portion Alignment Tape
M.EQ	OSCILLOSCOPE
INPUT	
ADJ.	SW2 (F2), SW3

<STEP 1>
MENU CONDITION

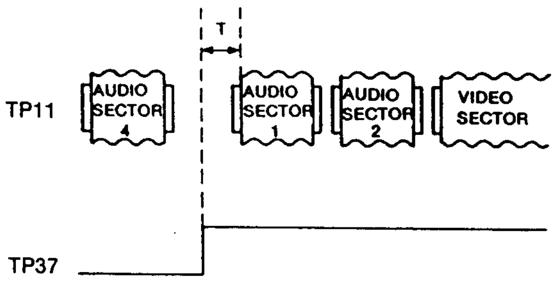
TEST MENU

Select the TRACKING FIX/VAR F10 to "FIX".

<STEP 2>

1. SCOPE CH1 : TP11 (REC AMP)
   SCOPE CH2 : TP37 (SERVO)
2. SCOPE TRIGGER : CH2
3. Adjust SW2, 3 and 4 so that the period T is as shown in Figure.

⦸ SW2, SW3, SW4


T
TP11
AUDIO SECTOR 4
AUDIO SECTOR 1
AUDIO SECTOR 2
VIDEO SECTOR
TP37

(PAL) SPECIFICATION: T=25.5µsec±0.5µsec
(NTSC) T=27.0µsec±0.5µsec

SW2: Fine adjustment
SW3: Pre fine adjustment
SW4: Coarse adjustment

6. MAJOR MECHANISM PARTS REPLACEMENT AND ADJUSTMENT PROCEDURES

6-1. GENERAL

When mechanical parts are replaced, pay attention to the following notes:

(1) Always turn the power off before replacing any parts.
(2) If any adjustment is necessary after the part is replaced, perform the adjustment after replacement.
(3) Use proper hand tools of fixtures.
(4) Be sure to clean the parts after replacement.

Also when the mechanical parts are replaced, follow the replacement procedures.

6-2. CENTER DRUM REPLACEMENT AND ADJUSTMENT

1. OPEN THE TOP PANEL

2. REMOVE THE HEAD CLEANING UNIT

Remove the two screws which are not glued.
One of the screw is under of the spring, so pull the spring knob and makes the space to insert a screw driver.

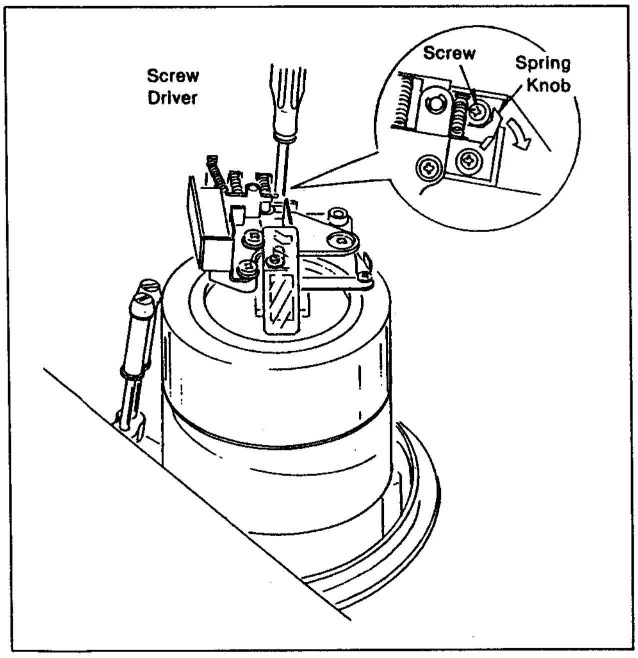
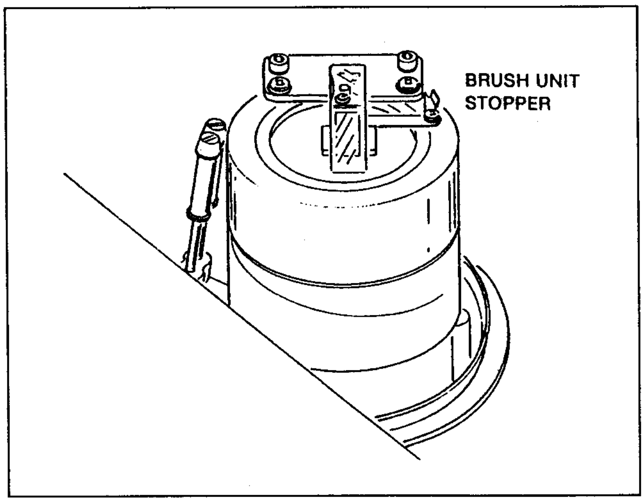


Fig. 8

3. REMOVE THE BRUSH UNIT

Loosen the screw of the brush unit stopper and separate the brush stopper unit from the brush unit, then rotates the brush unit about 90 degrees.
Remove the 2 screws (A) holding the brush unit in position see figure 9.



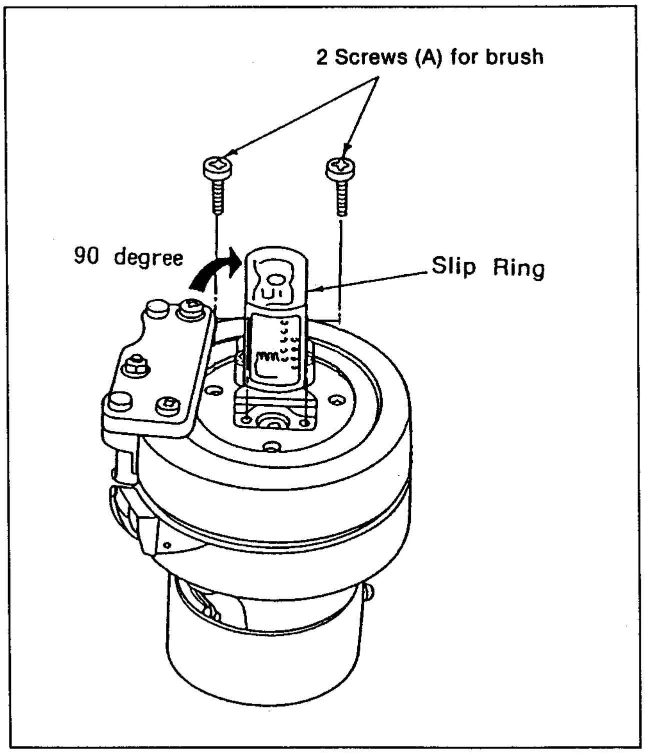


Fig. 9

4. REMOVE THE UPPER DRUM

Before taking off the upper drum, mark "A" area in order to put it back to the original position easily as shown in Figure.

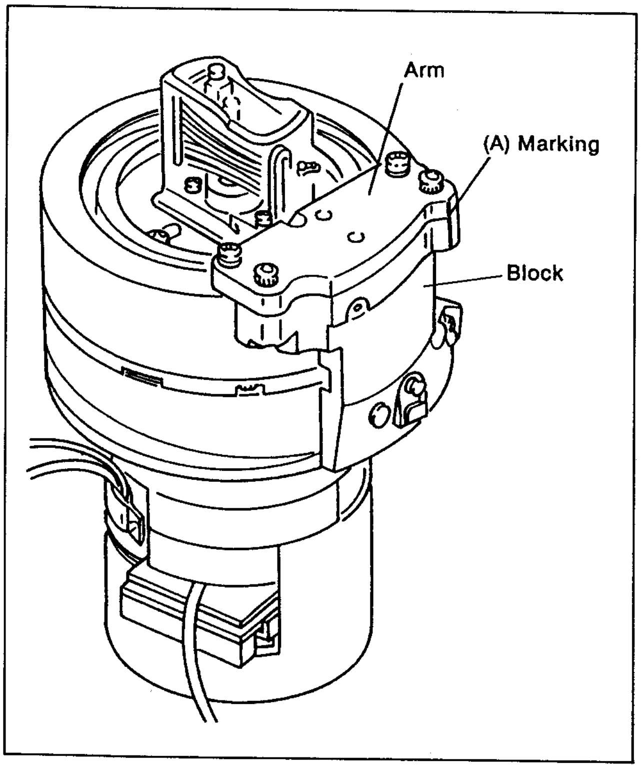

Arm
(A) Marking
Block

Fig. 10

Unscrew the two hex screws on the upper drum by torque wrench B (Fig. 12).
Unscrew the one hex screw on the back side of the upper drum by torque wrench A, the torque wrench A must select the rotation direction by the selector and it is necessary to attach the torque wrench adaptor.
Remove the Upper Drum unit.

Note: To prevent damage of the edge of upper drum, place upper drum up side down on work surface.

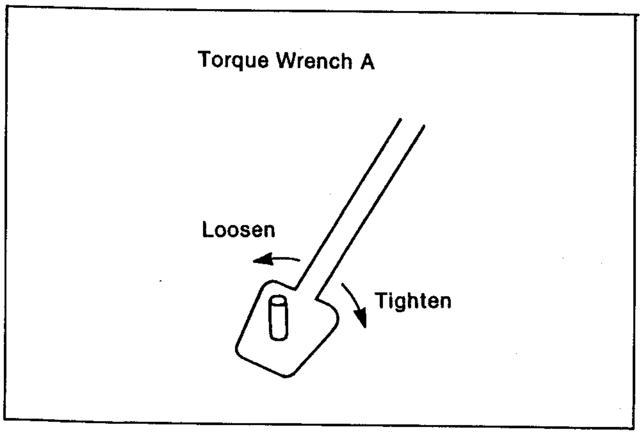

Torque Wrench A
Loosen
Tighten

Fig. 11

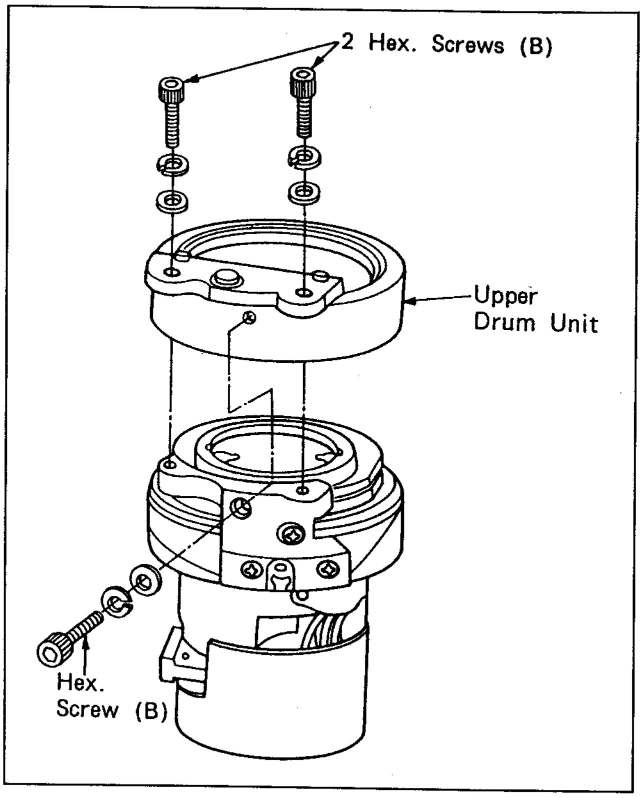

2 Hex. Screws (B)
Upper Drum Unit
Hex. Screw (B)

Fig. 12

5. REMOVE THE CENTER DRUM

Unscrew the two screw of the Center Drum and remove the Center Drum.
When replacing the Center Drum, it has two direction, so the correct direction of the Center Drum head A and B must be remembered.

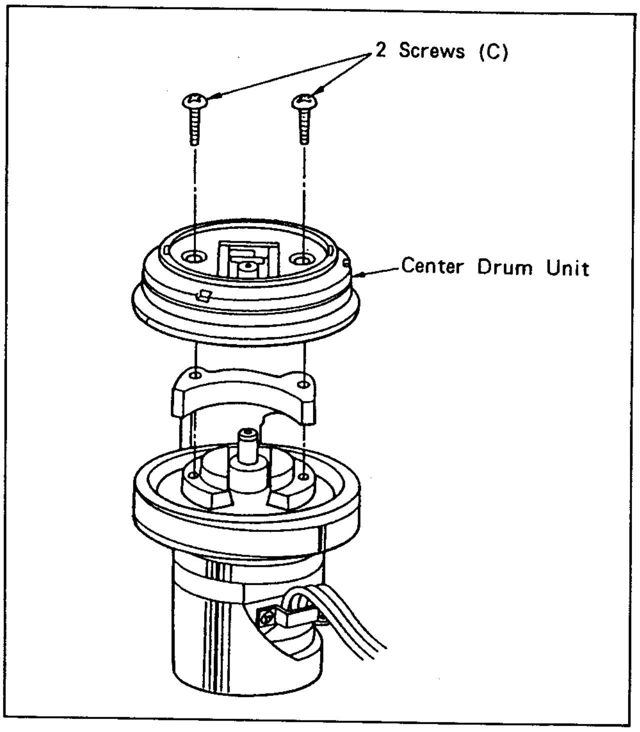

2 Screws (C)
Center Drum Unit

Fig. 13 Center Drum Removal

6. SET THE CENTER DRUM

Clean the tape path of the Lower Drum unit (A, B and C portions).
Check where the head chips are located and pick up the Center Drum so that your fingers never touch the head chips.
Set the Center Drum as same direction on the Lower Drum so that the head chips never touches at any place of the Lower Drum, and slightly tighten the two screws.

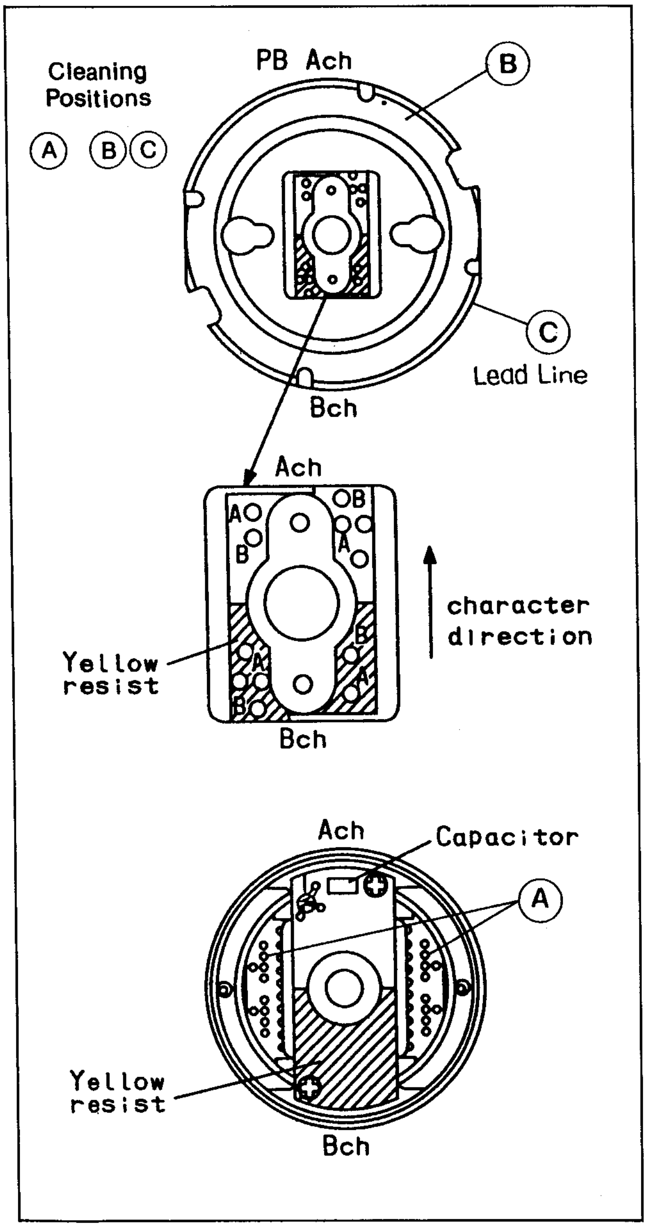


Fig. 14

7. ECCENTRIC ADJUSTMENT

1) Drum Replacement Tool Setup --- VFK0737B
The Drum Replacement tool has two functions, one is center drum eccentric adjustment and the other is head chip protrusion measurement.
Therefore it is necessary to select these functions. To select the functions there are two set up portions, one is height of the dial meter and the other is head contact portion angle.
The dial meter height is changed by turning the attachment shaft. For the eccentric adjustment the dial meter is in the higher position because the measurement portion must not touch the heads and must touch the road which is just above the head chips. For the head chip protrusion measurement, the measurement pick portion must touch the head chips, so the dial meter must be lower position as shown in Figure 15.

The other setup portion of this tool is head contact portion angle. For the eccentric adjustment the head contact is horizontal to run smoothly on the surface of the center drum and for the protrusion measurement the head contact is vertical to cross the head chips. The angle can be changed by finger, but the pick tool is useful to change this contact portion easily.

2) Set the attachment shaft is upper portion by turning the center screw clockwise.

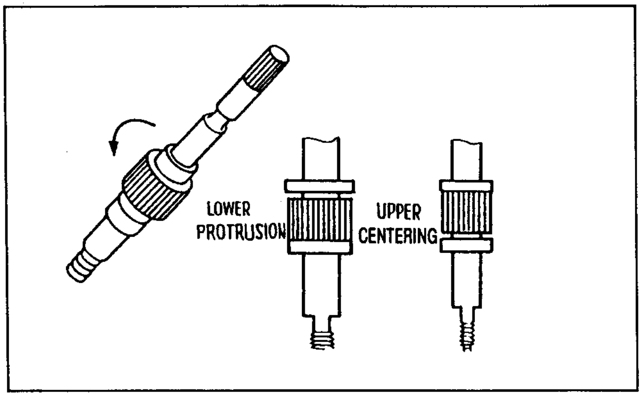


Fig. 15 Attachment Shaft

(3) Set the head contact portion to the horizontal position.

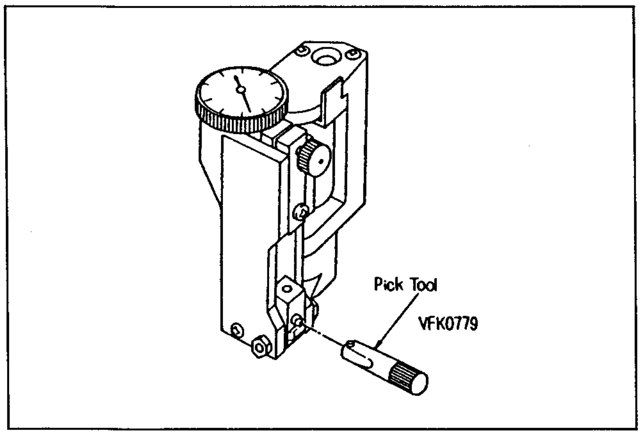

Pick Tool
VFK0779

Fig. 16 Pick Tool

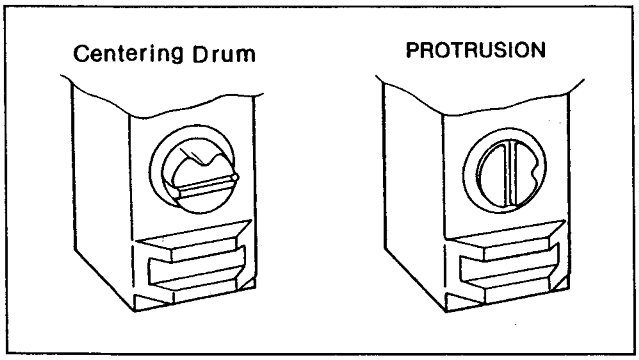

Centering Drum
PROTRUSION

Fig. 17 Pick Tool

(4) Install the attachment shaft at mechanism chassis.

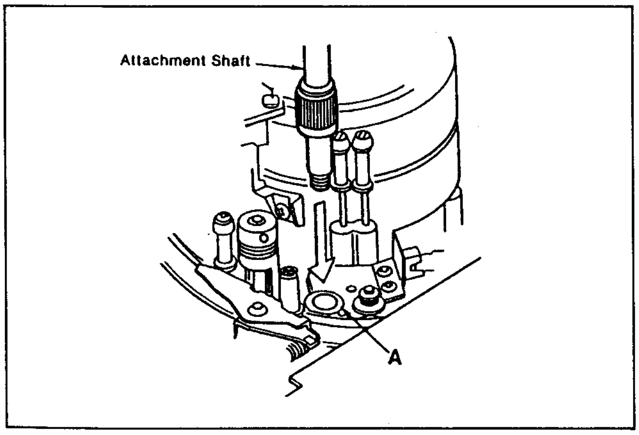

Attachment Shaft
A

Fig. 18 Attachment Shaft

(5) Set the main unit of the drum replacement tool at the attachment shaft.

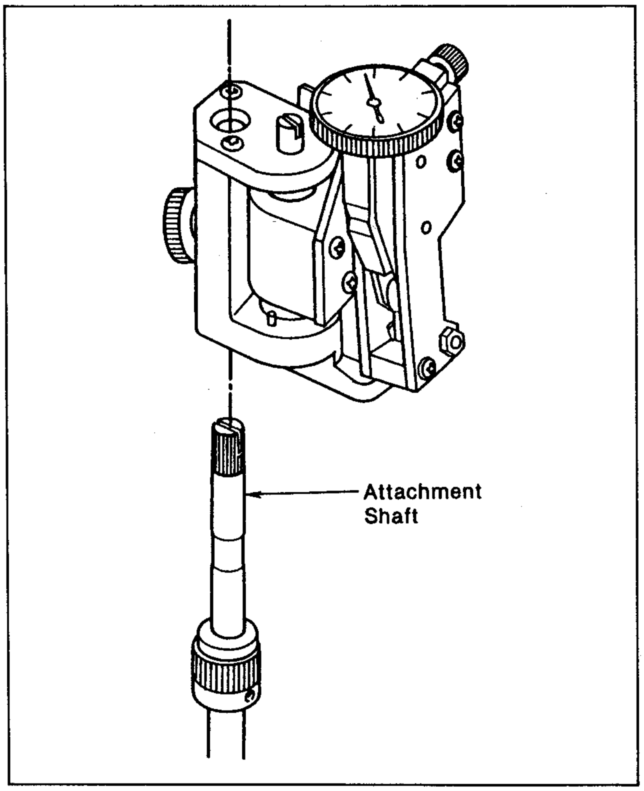

Attachment Shaft

Fig. 19 Center Drum Replacement Tool

(6) Confirm that the lever of center drum replacement tool is locked and install it to attachment shaft.

(7) Set the attachment plate to touch the lower drum, and fix the knob by rotating the screw.

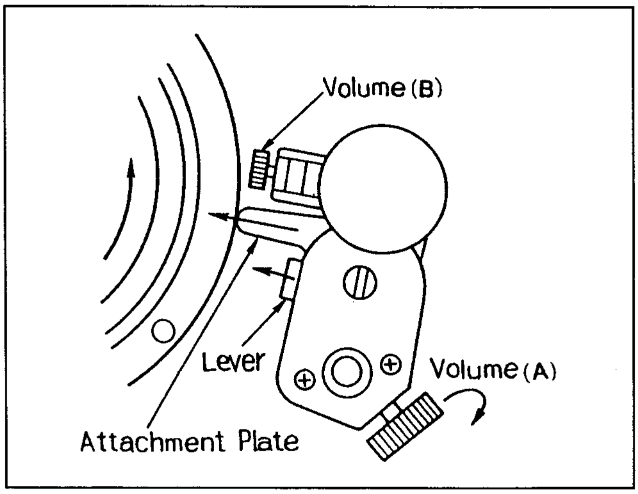

Volume (B)
Lever
Volume (A)
Attachment Plate

Fig. 20 Attachment Tool

(8) Set the dial gauge to zero position.
Adjust the knob of the center drum replacement tool of the head adjustment place so that the pick up point touches the drum and increase to 60 um indication.

(9) Rotate the outer ring of the dial gauge to set the meter indication to zero. Rotate the center drum if it is not concentric with its axis of rotation the meter will swing back and forth, indicating the amount of error. The maximum allowable tolerance is within +/- 1 um.

(10) If it is out of specification, adjust the position of the center drum by tapping lightly with the plastic handle of a screwdriver on the side of the drum opposite from the point of measurement. When the eccentricity is within +/- 1 um, gently tighten the 2 screws. Check eccentricity to make sure it is within specification. If it is out, repeat this procedure.

(11) Tighten the 2 screws of the center drum securely with torque wrench and check eccentricity again. If it is within ± 1 um pull the drum replacement tool away from the drum.

(12) Clean the block and upper drum of attachment surfaces (A,B and C portions) as shown in Figure 23. Remove the drum replacement tool and attachment shaft.

(13) Reinstall the upper drum and tighten loosely the 2 hex screws of top of the arm and block using the torque wrench B.

(14) Tighten loosely the hex screw which is located at the back of the block (screw E) using the torque wrench.
Confirm that there is a small allowance for upper drum movement.

(15) Match the marking on arm and block and tighten the hex screw (E) which is located at back side of the lower drum by using the torque wrench A to 6kg. And tighten the 2 hex screws (D) of top of it by using the torque wrench to 8kg.

If not, upper drum adjustment is required as follows. (as if change the upper drum)

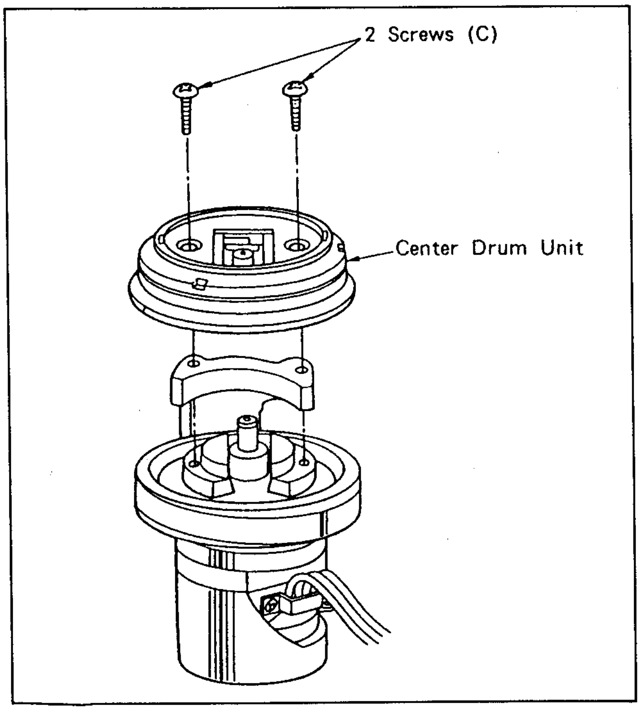

2 Screws (C)
Center Drum Unit

Fig. 21 Center Drum

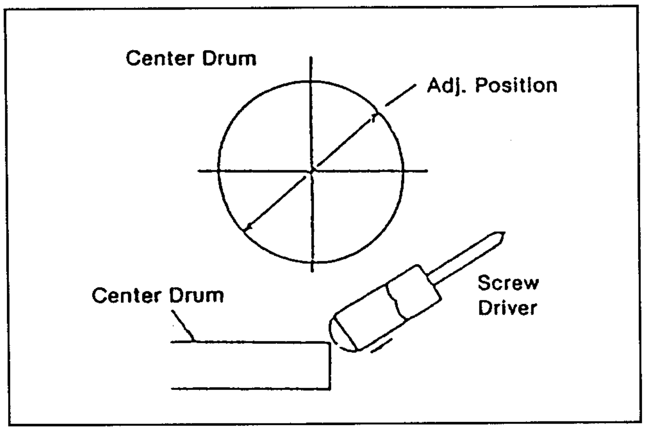

Center Drum
Adj. Position
Center Drum
Screw
Driver

Fig. 22 Adjustment Position

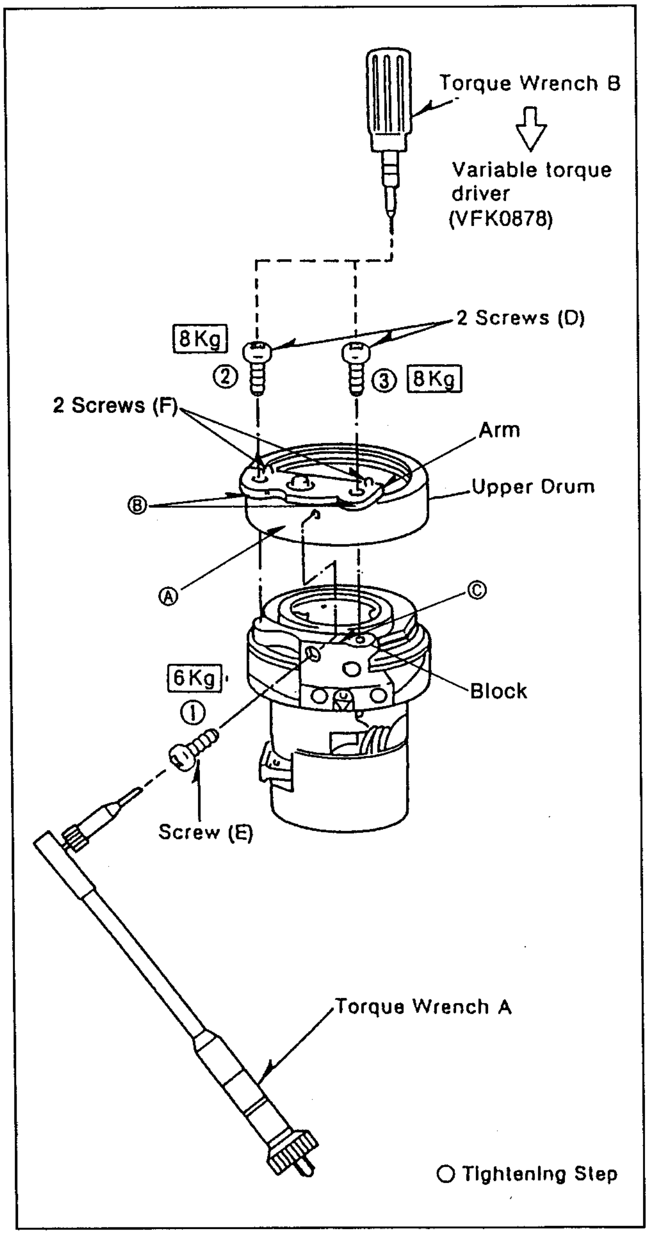
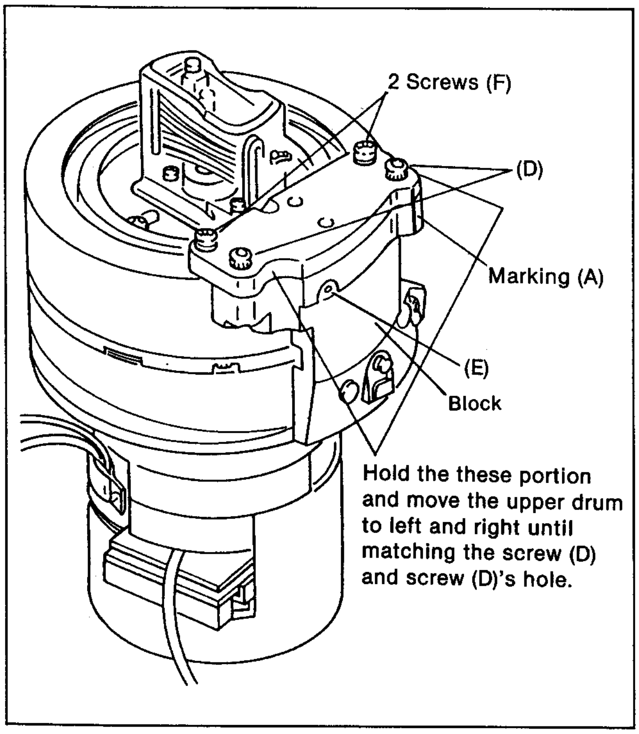

Torque Wrench B
Variable torque driver (VFK0878)
8Kg
②
2 Screws (D)
③
8Kg
2 Screws (F)
Arm
Upper Drum
Ⓑ
Ⓐ
Ⓒ
6Kg
①
Block
Screw (E)
Torque Wrench A
○ Tightening Step

Fig. 23 Install Upper Drum

UPPER DRUM INSTALLATION and ADJUSTMENT

(1) Tighten the hex screw (E) matching the arm and block by using the torque wrench A to 6kg.
(2) Loosen the 2 screws (F) until release the spring washer, and match the screw (D) and screw (D)'s hole moving the upper drum to left and right by hand.
(3) Tighten the 2 screws (D) matching the arm and block by using the torque wrench to 8kg.
(4) Tighten the 2 screws (F) by using the torque wrench to 6kg.
(5) Erase the marking (A) by using the cleaning cloth.


2 Screws (F)
(D)
Marking (A)
(E)
Block

Hold the these portion and move the upper drum to left and right until matching the screw (D) and screw (D)'s hole.

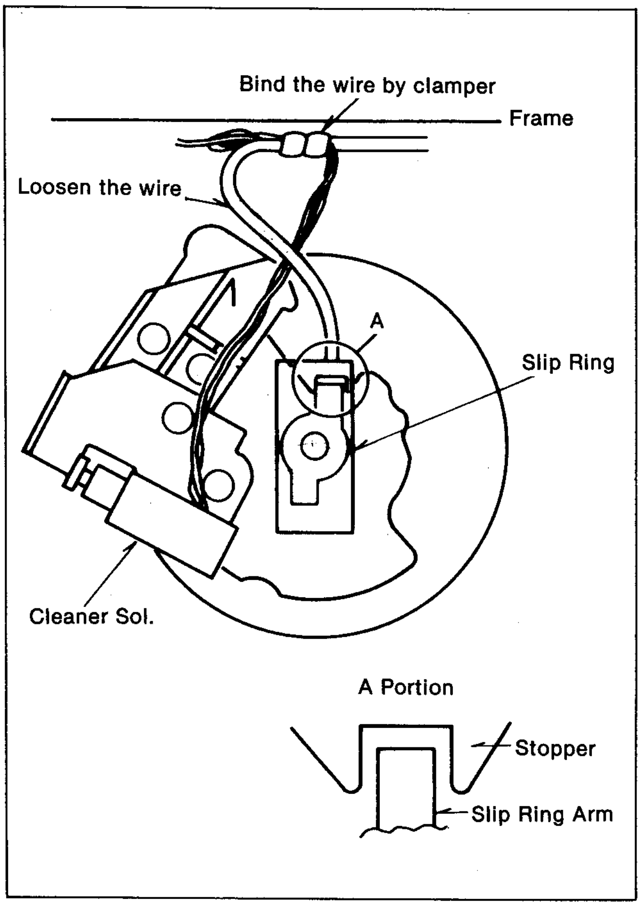
16) Reinstall the slip ring and tighten the 2 screws.

17) Reinstall the cleaner roller unit to the original position.

Note: After replaced center drum, please refer to Technical information. (Subject: CENTER DRUM REPLACEMENT and ADJUSTMENT).

18) After install the slip ring and cleaner roller, bind the wire using clamper as follows.

* Make loosen the wire when it is binded.


Bind the wire by clamper
Frame
Loosen the wire
A
Slip Ring
Cleaner Sol.
A Portion
Stopper
Slip Ring Arm

6-3. DRUM UNIT REPLACEMENT

6-3-1. Replacement

(Removal)

1. Remove the top panel (Refer to item 2-1).
2. Disconnect the P504 and P511 as shown in Figure 6-3-1.

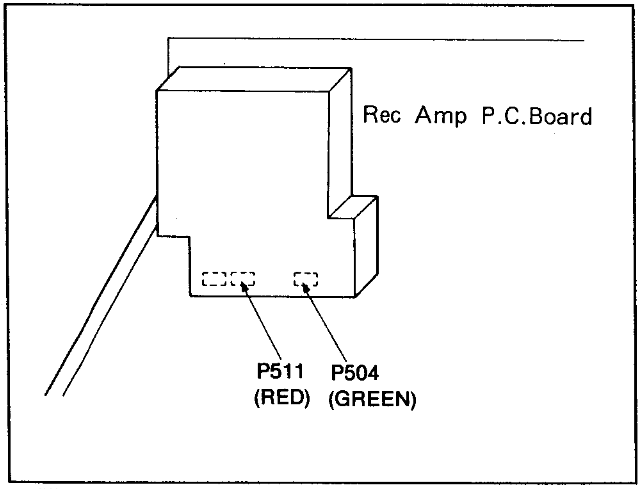

Rec Amp P.C.Board
P511 (RED)
P504 (GREEN)

Fig. 6-3-1 Drum Connector P504, P511 Removal

3. Disconnect the connector P523 shown in Figure 6-3-2.

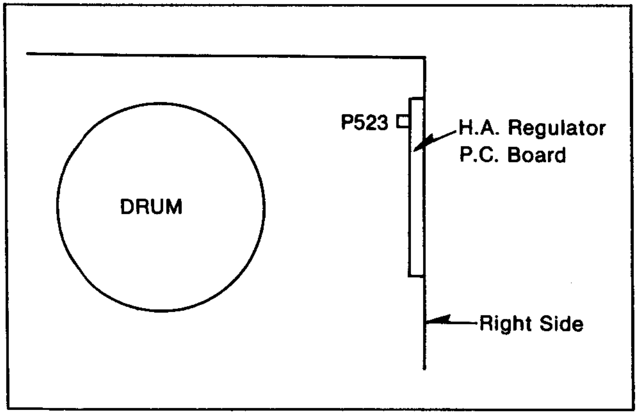
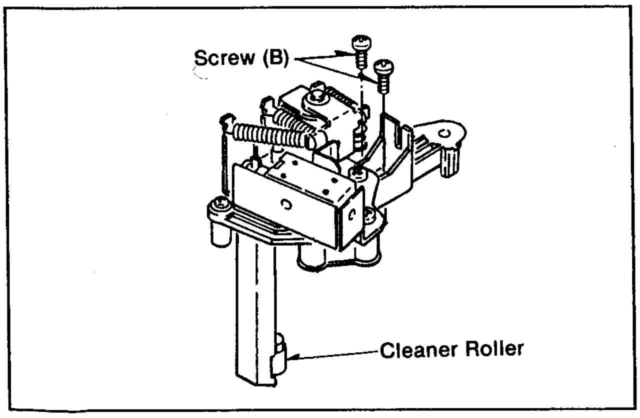

DRUM
P523
H.A. Regulator P.C. Board
Right Side

Fig. 6-3-2 Drum Connector P523

4. Unscrew the 2 screws (B) and remove the Cleaner Roller as shown in Figure below.


Screw (B)
Cleaner Roller

5. Remove the bottom panel (Refer to item 2-3).
6. Remove the L P.C.Boards (L1 to L4).
7. Unscrew the screw (A) and remove the bottom cover as shown below.

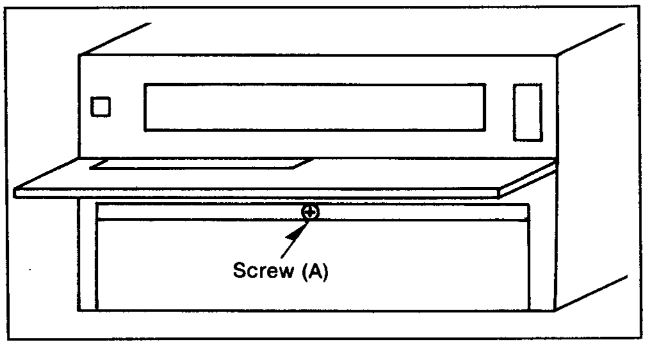


Fig. 6-3-3 Bottom cover

8. Disconnect the 3 connectors (P531, P532, P538) on the Buffer amp P.C.Board and a connector (P561) on the Mech interface P.C.Board.

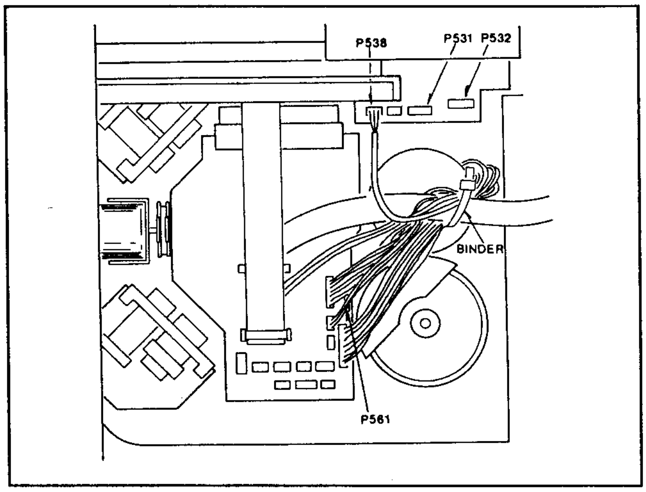
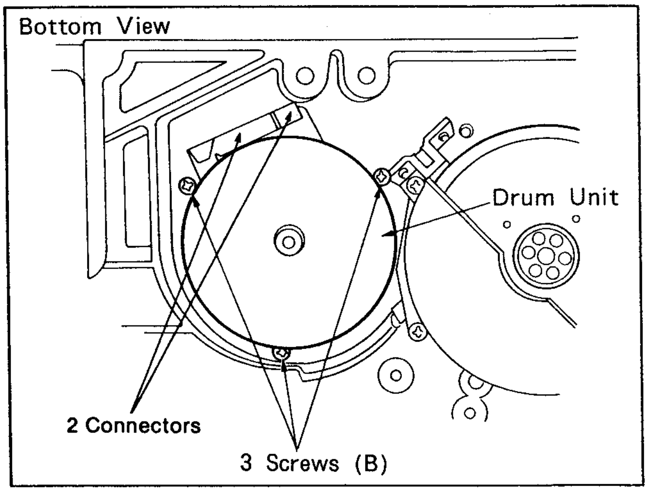

P538
P531
P532
BINDER
P561

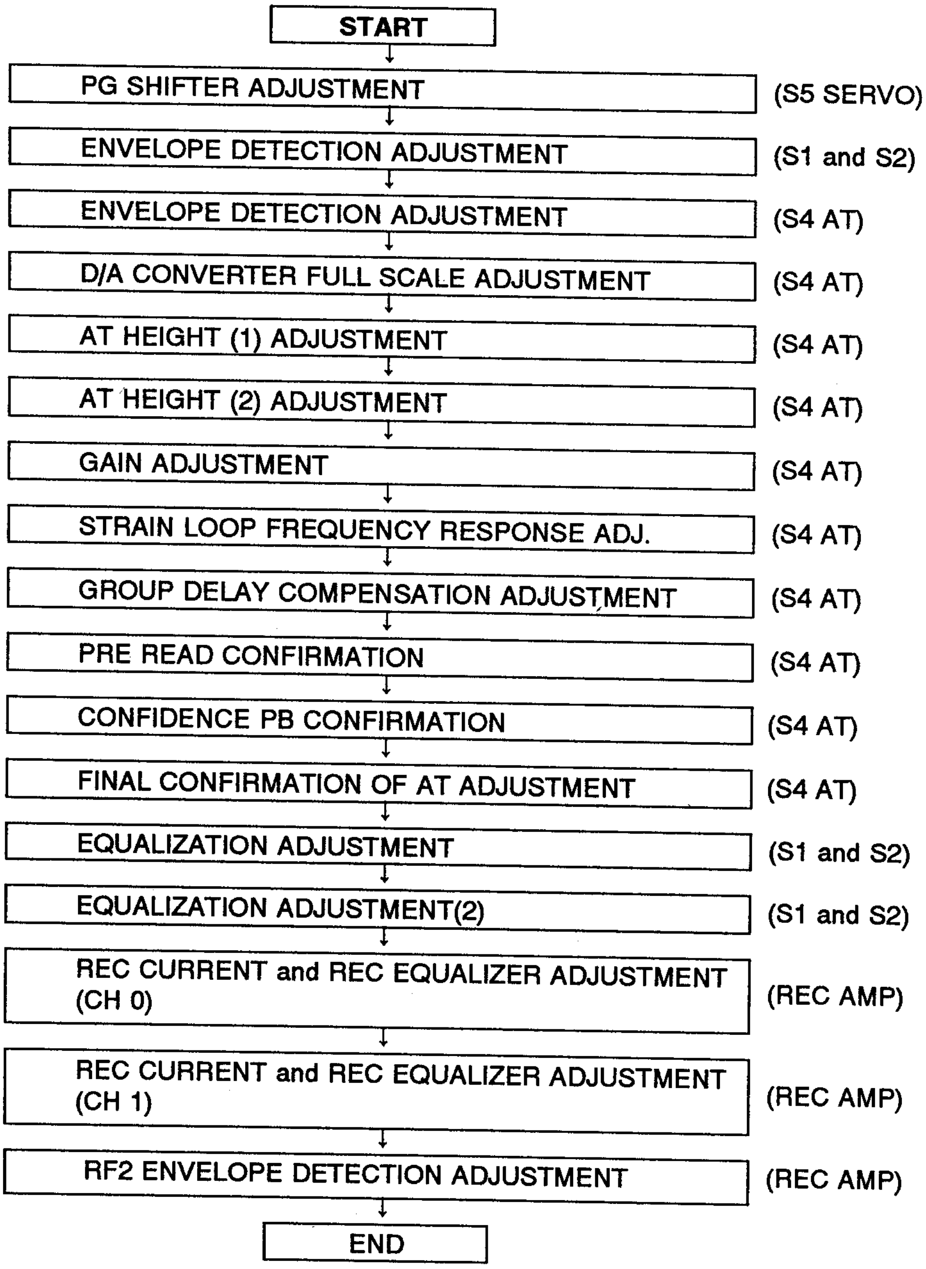
Fig. 6-3-4 Drum Unit Removal

9. Disconnect the 2 connectors on the drum unit as shown below.
10. Unscrew the 3 screws (B) and remove the Drum Unit as shown in Figure 6-3-4.

Note: After replaced center drum, please refer to Technical Information. (Subject: CENTER DRUM REPLACEMENT and ADJUSTMENT).


Bottom View
Drum Unit
2 Connectors
3 Screws (B)

DRUM ELECTRICAL ADJUSTMENT FLOWCHART


START
PG SHIFTER ADJUSTMENT
(S5 SERVO)
ENVELOPE DETECTION ADJUSTMENT
(S1 and S2)
ENVELOPE DETECTION ADJUSTMENT
(S4 AT)
D/A CONVERTER FULL SCALE ADJUSTMENT
(S4 AT)
AT HEIGHT (1) ADJUSTMENT
(S4 AT)
AT HEIGHT (2) ADJUSTMENT
(S4 AT)
GAIN ADJUSTMENT
(S4 AT)
STRAIN LOOP FREQUENCY RESPONSE ADJ.
(S4 AT)
GROUP DELAY COMPENSATION ADJUSTMENT
(S4 AT)
PRE READ CONFIRMATION
(S4 AT)
CONFIDENCE PB CONFIRMATION
(S4 AT)
FINAL CONFIRMATION OF AT ADJUSTMENT
(S4 AT)
EQUALIZATION ADJUSTMENT
(S1 and S2)
EQUALIZATION ADJUSTMENT(2)
(S1 and S2)
REC CURRENT and REC EQUALIZER ADJUSTMENT (CH 0)
(REC AMP)
REC CURRENT and REC EQUALIZER ADJUSTMENT (CH 1)
(REC AMP)
RF2 ENVELOPE DETECTION ADJUSTMENT
(REC AMP)
END

6-4. S-REEL BASE UNIT/T-REEL BASE UNIT REPLACEMENT AND ADJUSTMENT

6-4-1. Replacement

(Removal)

1. Remove the top panel (Refer to item 2-1).
2. Remove the front loading unit (Refer to item 2-3).
3. Remove the bottom panel (Refer to item 2-2).
4. Remove the L boards from L1 to L4.
5. Unscrew the 4 screws (A) and disconnect the 4 Connectors (B), then remove the 4 Cables as shown in Figure 6-4-1.
6. Unscrew 3 screws (B) and remove the Photo P.C.B. Angle as shown in Figure 6-4-2.
7. Turn the Worm Motor Belt so that the Rail Holders (A) and (B) are appear as shown in Figure 6-4-2 and 6-4-3.
8. Unscrew the 8 screws (C) and remove the Rail Holders.
9. Through out the S-Reel Base and T-Reel Base from the Rail A and B.
10. Remove the S-Brake Unit, T-Brake Unit, S-Brake Solenoid and T-Brake Solenoid following the items 6-5 and 6-6.

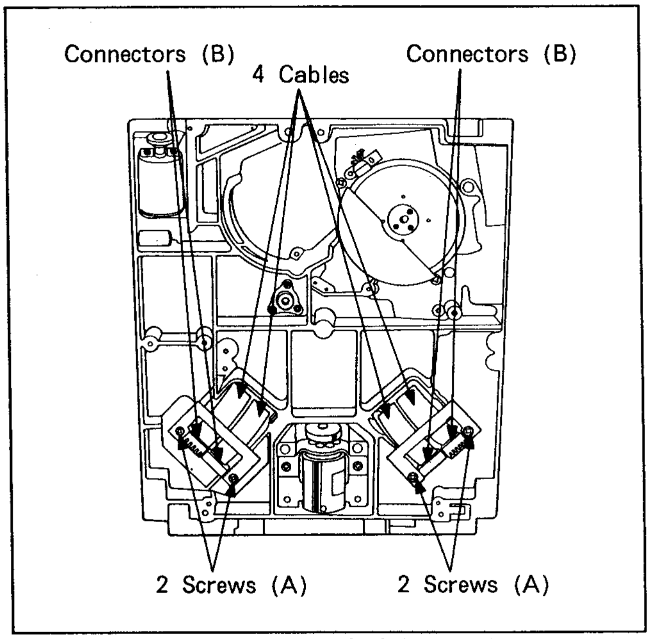

Connectors (B)
4 Cables
Connectors (B)
2 Screws (A)
2 Screws (A)

Fig. 6-4-1 Removal of the Cables

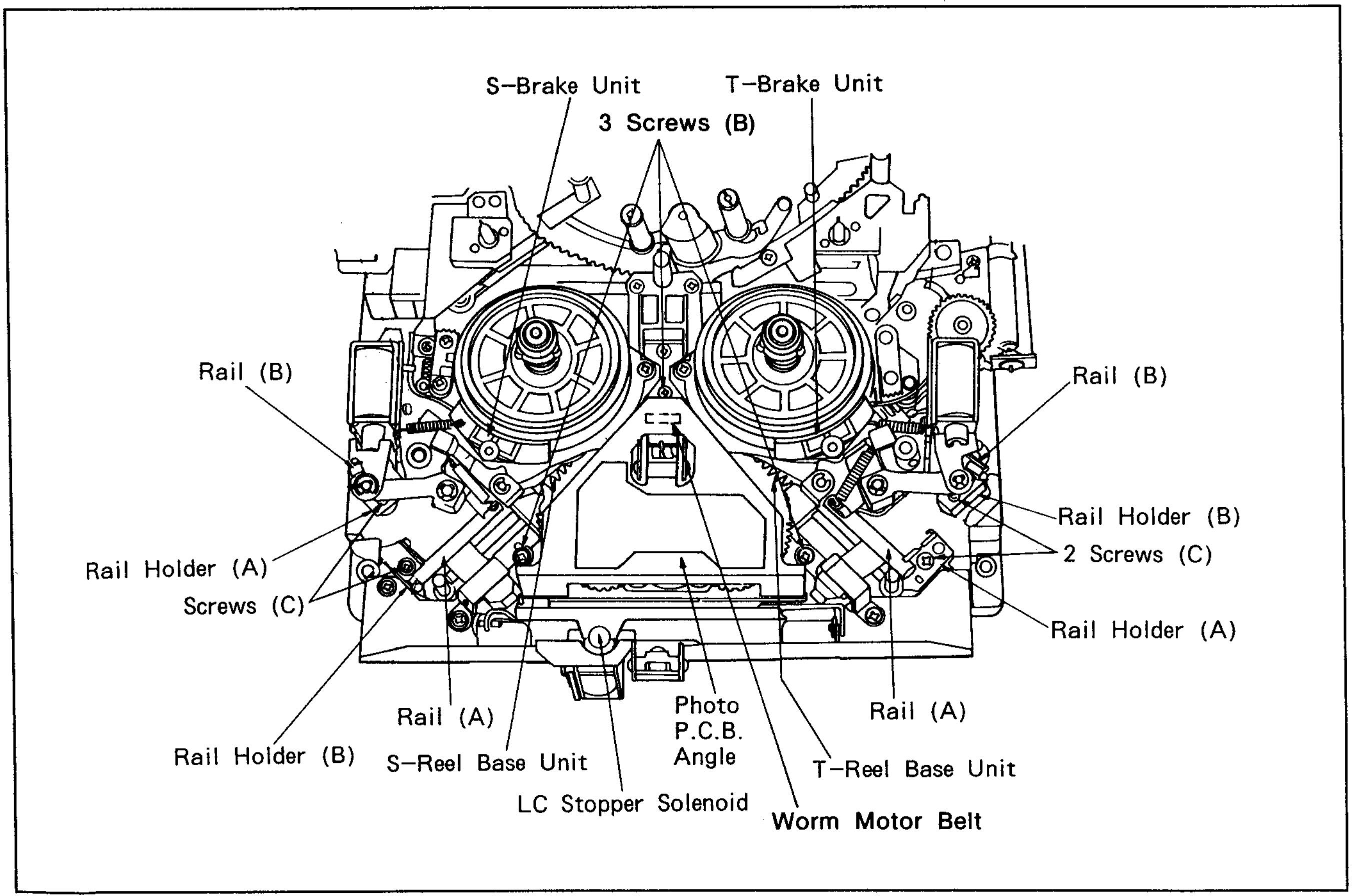

S–Brake Unit
T–Brake Unit
3 Screws (B)
Rail (B)
Rail (B)
Rail Holder (B)
2 Screws (C)
Rail Holder (A)
Screws (C)
Rail Holder (A)
Rail (A)
Rail Holder (B)
S–Reel Base Unit
LC Stopper Solenoid
Photo
P.C.B.
Angle
Rail (A)
T–Reel Base Unit
Worm Motor Belt

Fig. 6-4-2 Removal of the S-Reel Base Unit and T-Reel Base Unit (Small Cassette Position)

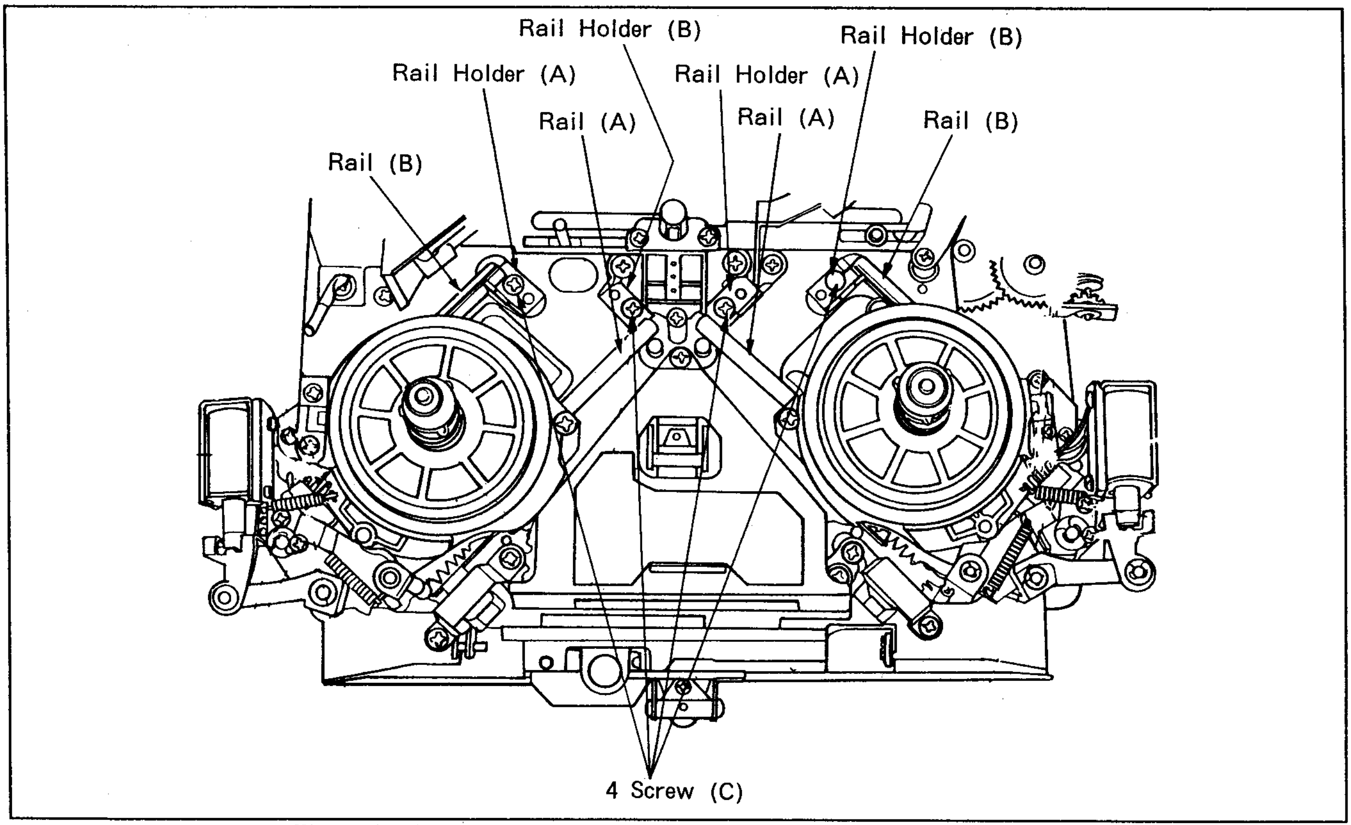

Rail Holder (B)
Rail Holder (B)
Rail Holder (A)
Rail Holder (A)
Rail (A)
Rail (A)
Rail (B)
Rail (B)
4 Screw (C)

Fig. 6-4-3 Removal of the S-Reel Base Unit and T-Reel Base unit
(Large Cassette Position)

6-4-2. Reel Base Phase Adjustment

1. Install the S-Reel Base and T-Reel Base in the Small Cassette position, then of the Reel Base Drive Gears S-Reel Base and T-Reel Base should be as shown in Figure 6-4-2.

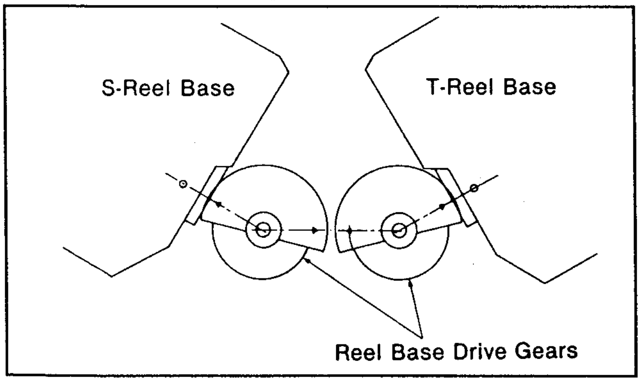

S-Reel Base
T-Reel Base
Reel Base Drive Gears

Fig. 6-4-4 Phase of the Reel Base Drive Gear and S-Reel Base or T-Reel Base

(Installation)

1. Install the S-Brake Unit and S-Brake Solenoid to the S-Reel Base, and install the T-Brake Unit and T-Brake Solenoid to the T-Reel Base in reverse order, following the steps on items 6-5 and 6-6.
2. Install the S-Reel Base and T-Reel Base, performing the above adjustment, in the reverse order of the previous steps.

6-4-3. Cassette Supporter Height Adjustment

1. Remove the cassette carriage.
2. Set the Mech Neutral Adjustment Plate on the reel table correctly as shown in Figure 6-4-5.
3. Loosen the hex screw so that the cassette support is contact with the Mech Neutral Plate.
4. Tighten the hex screw.

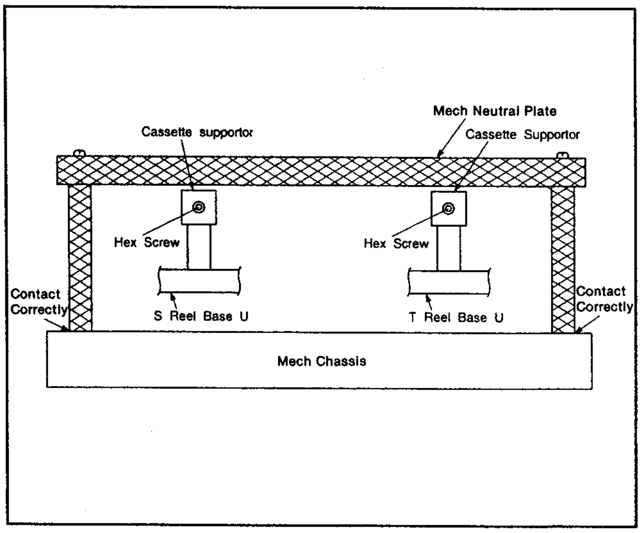

Mech Neutral Plate
Cassette supportor
Cassette Supportor
Hex Screw
Hex Screw
Contact Correctly
Contact Correctly
S Reel Base U
T Reel Base U
Mech Chassis

Fig. 6-4-5

6-5. SUPPLY BRAKE UNIT AND TAKE UP BRAKE UNIT REPLACEMENT

(Removal)

1. Remove the top panel (Refer to item 2-1).
2. Remove the front loading unit (Refer to item 2-3).
3. Remove the 4 E-Rings, 6 Washers and 2 Brake Spring (2).
4. Remove the 2 Brake Interlock Angle and pull out the S-Brake Unit and the T-Brake Unit as shown in Figure 6-5-1.

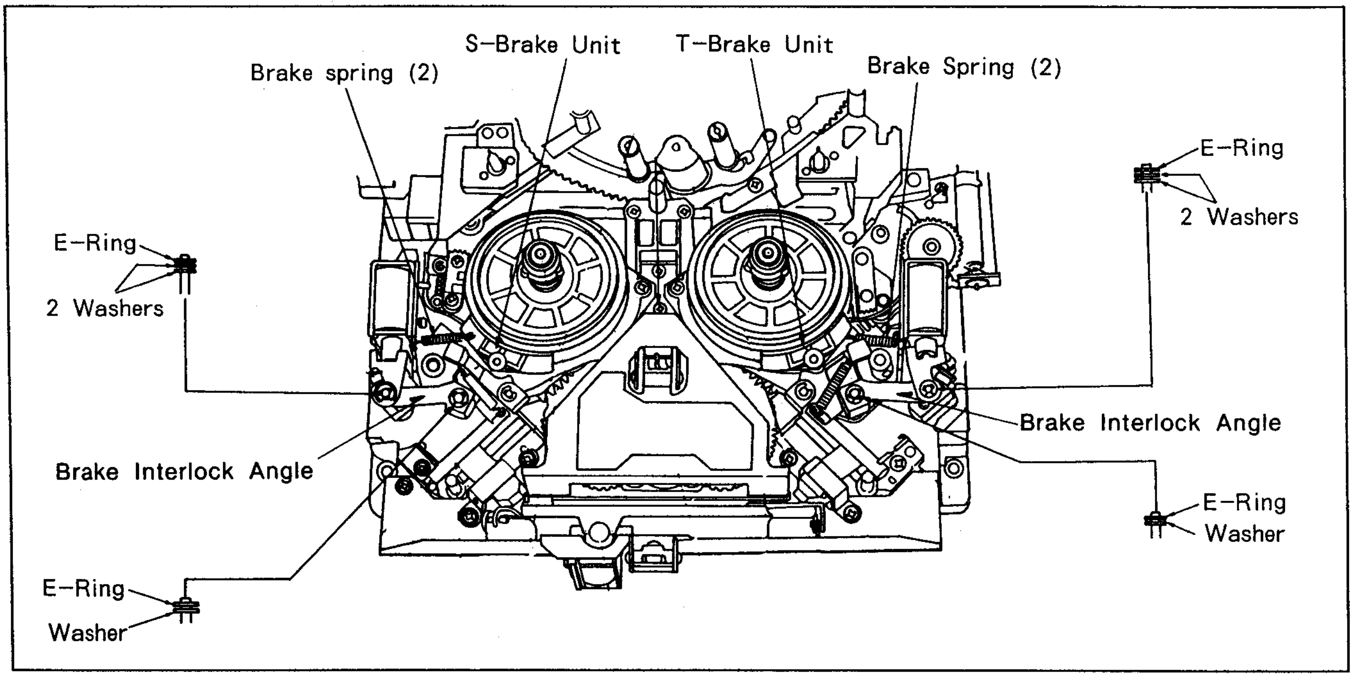

S-Brake Unit
T-Brake Unit
Brake spring (2)
Brake Spring (2)
E-Ring
2 Washers
E-Ring
2 Washers
Brake Interlock Angle
Brake Interlock Angle
E-Ring
Washer
E-Ring
Washer

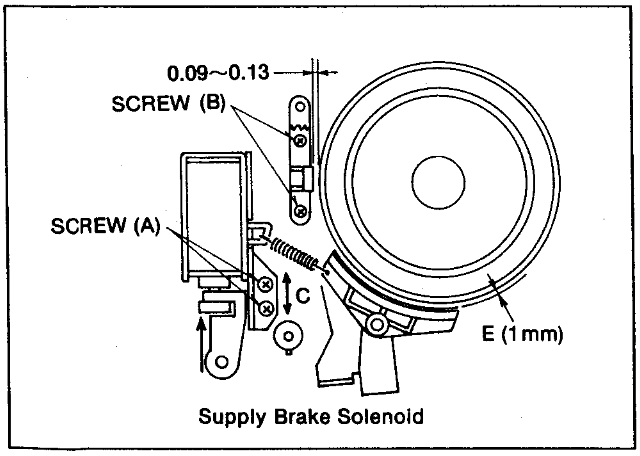
Fig. 6-5-1 Removal of the S-Brake Unit or the T-Brake Unit

(Installation)

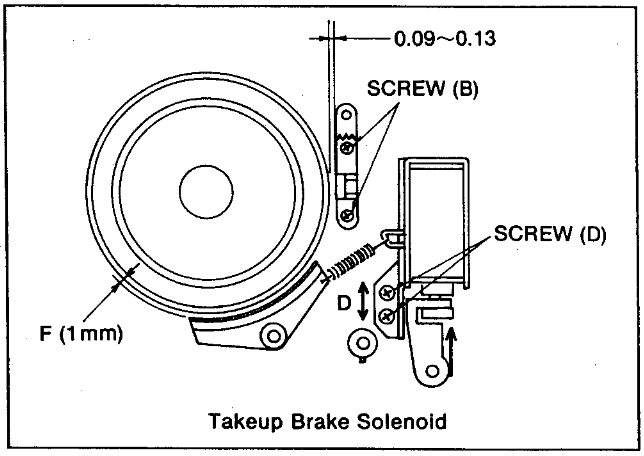
1. Install the S-Brake Unit and the T-Brake Unit following the previous steps in reverse order.
2. After installation, position adjustment should be preformed as follows.

(Adjustment)

1. When moving the spring pin in each brake solenoid planger in direction (C) and (D), observe the clearance (E) between each brake pad and it's turntable. This clearance should be between 1mm.
2. If not, loosen the 2 screws (A) supply side and take up side and adjust the brake solenoid so that the clearance (E) is within specification. And tighten the 2 screws (A).
3. Observe the clearance (F) as shown in figure and make sure that it is within 0.09mm to 0.13mm.
4. If not, loosen the 2 screws (B) and clearance (F) is within specification. And tighten the 2 screws (B).


0.09~0.13
SCREW (B)
SCREW (A)
C
E (1mm)

Supply Brake Solenoid


0.09~0.13
SCREW (B)
SCREW (D)
D
F (1mm)

Takeup Brake Solenoid

6-6. SUPPLY BRAKE SOLENOID AND TAKE UP BRAKE SOLENOID REPLACEMENT

(Removal)

1. Remove the top panel (Refer to item 2-1).
2. Remove the front loading unit (Refer to item 2-3).
3. Remove the 6 soldering portions, 2 Brake Spring (2) and 4 screws (A), then pull out the S-Brake Solenoid and the T-Brake Solenoid as shown in Figure 6-6-1.

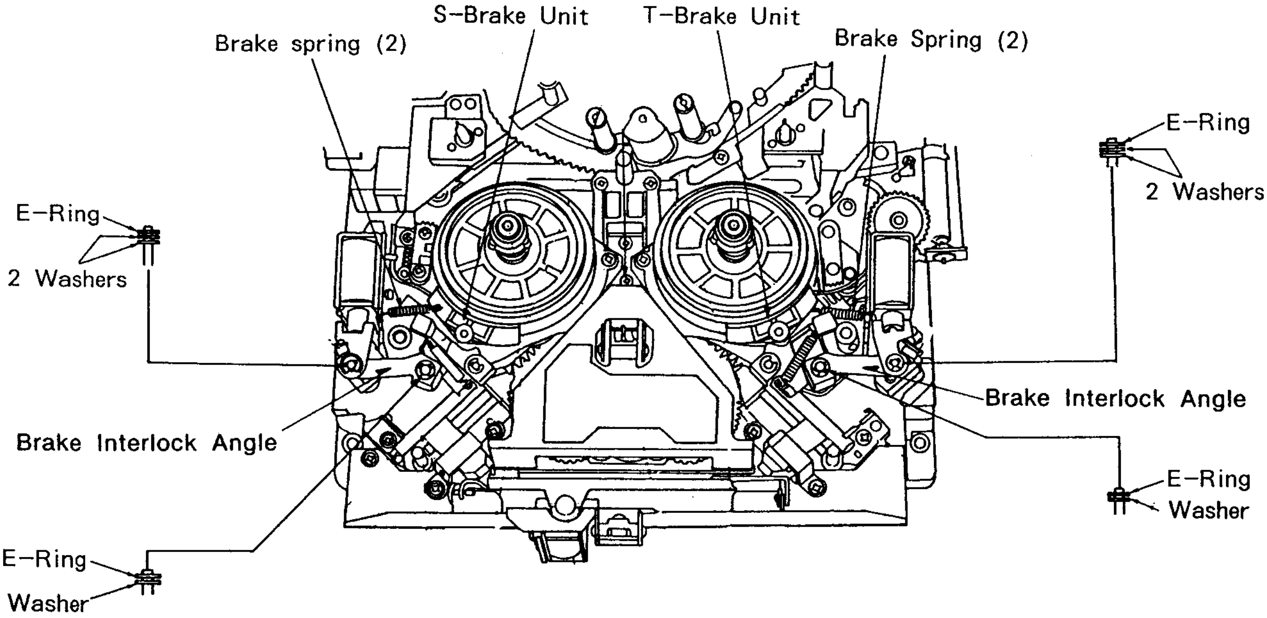

S–Brake Unit
T–Brake Unit
Brake spring (2)
Brake Spring (2)
E–Ring
2 Washers
E–Ring
2 Washers
Brake Interlock Angle
Brake Interlock Angle
E–Ring
Washer
E–Ring
Washer

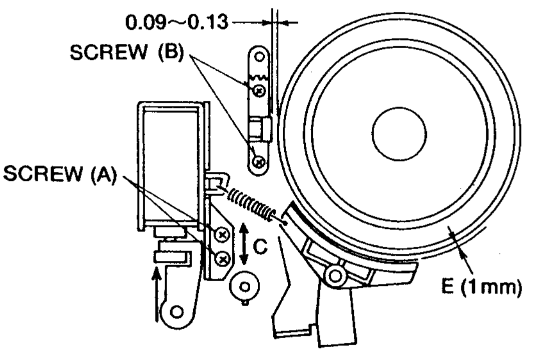
Fig. 6-6-1 Removal of the S-Brake Solenoid and the T-Brake Solenoid

(Installation)

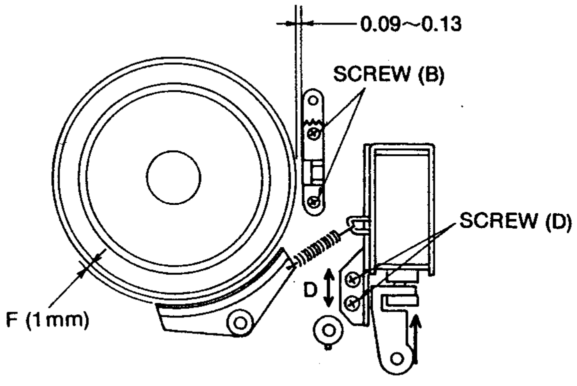
1. Install the S-Brake Solenoid and T-Brake Solenoid following the previous steps in reverse order.
2. After installation, position adjustment should be performed as follows.

(Adjustment)

1. When moving the spring pin in each brake solenoid planger in direction (C) and (D), observe the clearance (E) between each brake pad and it's turntable. This clearance should be between 1mm.
2. If not, loosen the 2 screws (A) supply side and take up side and adjust the brake solenoid so that the clearance (E) is within specification. And tighten the 2 screws (A).
3. Observe the clearance (F) as shown in figure and make sure thet it is within 0.09mm to 0.13mm.
4. If not, loosen the 2 screws (B) and clearance (F) is within specification. And tighten the 2 screws (B).


0.09~0.13
SCREW (B)
SCREW (A)
C
E (1mm)

Supply Brake Solenoid


0.09~0.13
SCREW (B)
SCREW (D)
D
F (1mm)

Takeup Brake Solenoid

6-7. PINCH ARM UNIT REPLACEMENT

(Removal)

1. Turn the Sub Loading Motor so that the Loading Arm Unit is loading condition and pushing hold the Ring Drive Gear, then turn the loading Ring to the position as shown in Figure 6-7-1.

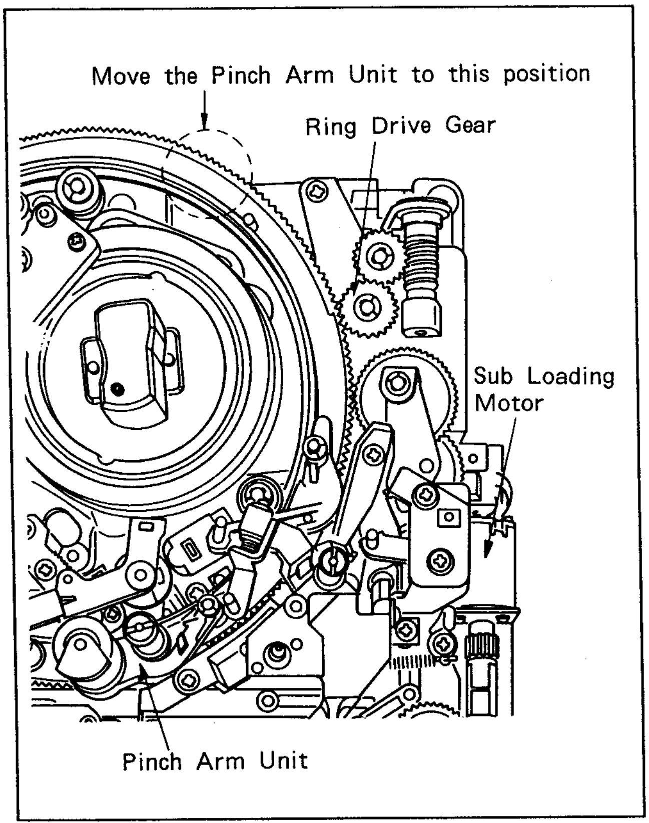

Move the Pinch Arm Unit to this position
Ring Drive Gear
Sub Loading Motor
Pinch Arm Unit

Fig. 6-7-1 Replacement of the Pinch Arm Unit

2. Remove the E-Ring and Washer and pull out the Pinch Arm Unit as shown in Figure 6-7-2.

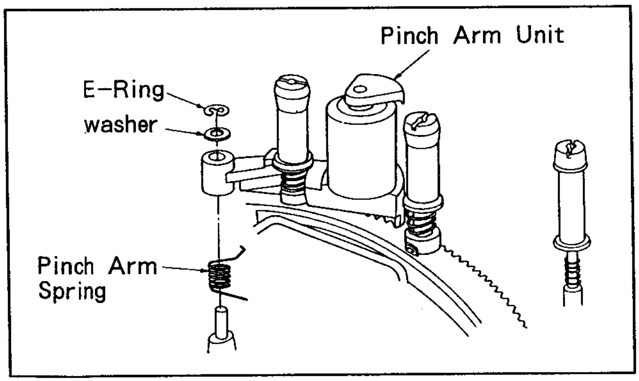

Pinch Arm Unit
E-Ring
washer
Pinch Arm Spring

Fig. 6-7-2 Replacement of the Pinch Arm Unit

(Installation)

1. Install the Pinch Arm Unit following the previous steps in reverse order.

6-8. A/C HEAD REPLACEMENT

6-8-1. Replacement

- Tools required:
  Nut Driver (7m/m)(VFK0676)
  Hex. Wrench (VFK0326)

(Removal)

1. Remove the nut (A), loosen the hex-screw (B), hang off the height adjustment spring and then remove A/C Head assembly as shown in Figure 6-8-1.

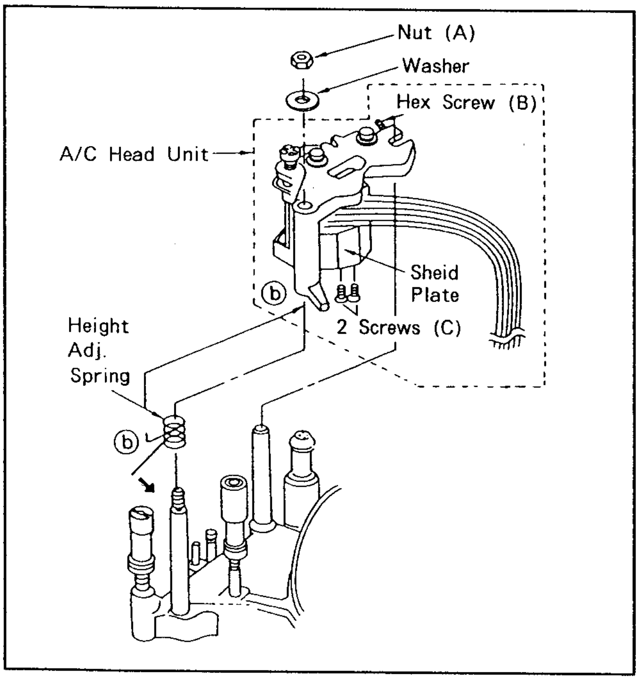


Fig. 6-8-1 A/C Head Removal

2. Remove the shield plate by removing 2 screws (C) as shown in Figure 6-8-1 and disconnect the connectors P1, 3, 4, 5 which is on Cue Audio P.C.Board (S3).
3. Unscrew head wires. (When unsolder head wires, do not unsolder all at the same time)

(Installation)

1. Confirm that the head and head mounting plate is set to be approximately 1 m/m with the Plate parallel as shown in Figure 6-8-2. If it is not, adjust the each screws to these plate parallel.
2. Solder the lead wires of the new A/C head.
3. Reinstall the shield plate onto the A/C head assembly.
4. Install the new A/C head assembly.
5. Hang on the height adjustment spring and, tighten the nut (A) as shown in Figure 6-8-1 and 6-8-4.
6. Clean the surface of the A/C head.

Note: After the installation, Mechanical and Electrical Adjustment should be performed Hex screw (B) is kept loose until finish the A/C Head height adjustment.

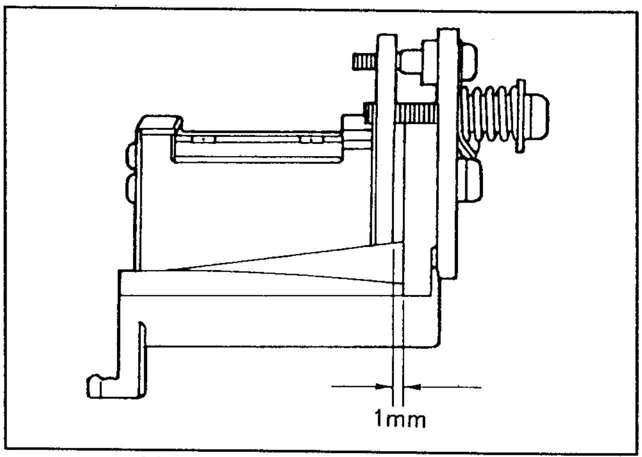


Fig. 6-8-2 A/C Head Assembly

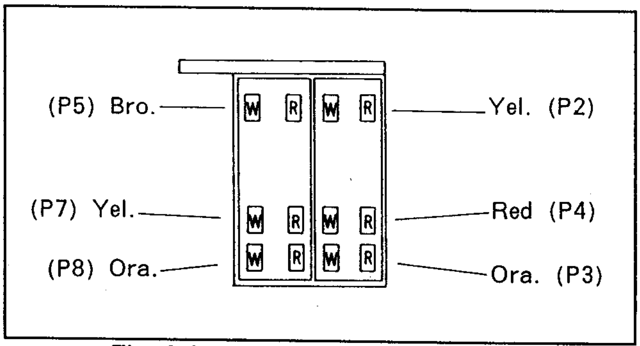


Fig. 6-8-3 Connectors on A/C Head

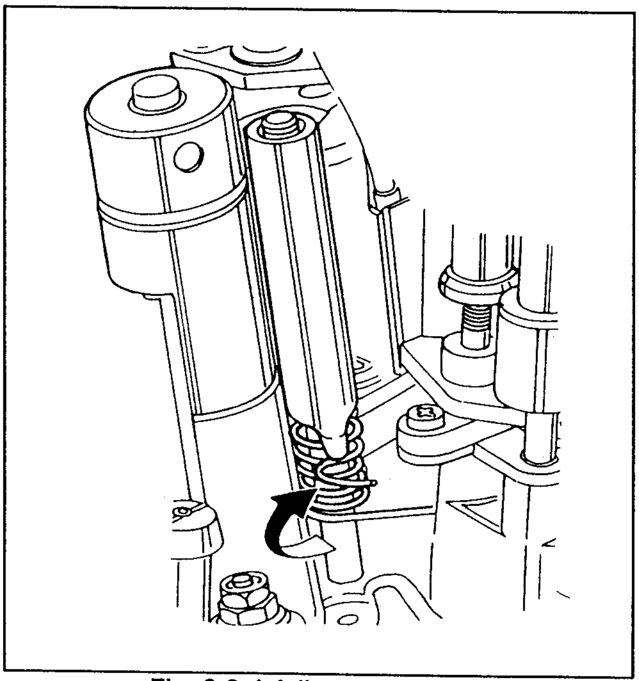
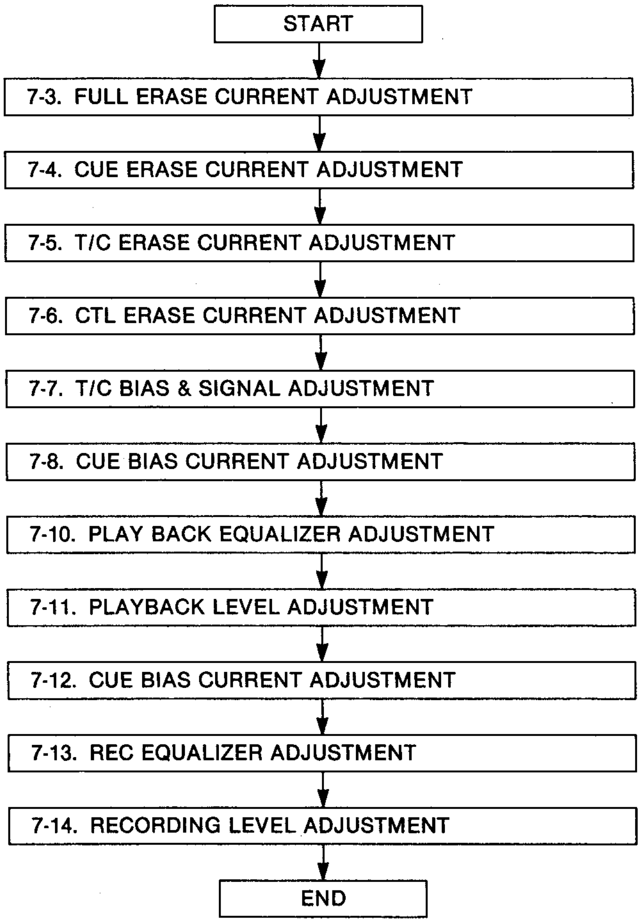


Fig. 6-8-4 Adjustment Spring

A/C HEAD ELECTRICAL ADJUSTMENT FLOWCHART


START
7-3. FULL ERASE CURRENT ADJUSTMENT
7-4. CUE ERASE CURRENT ADJUSTMENT
7-5. T/C ERASE CURRENT ADJUSTMENT
7-6. CTL ERASE CURRENT ADJUSTMENT
7-7. T/C BIAS & SIGNAL ADJUSTMENT
7-8. CUE BIAS CURRENT ADJUSTMENT
7-10. PLAY BACK EQUALIZER ADJUSTMENT
7-11. PLAYBACK LEVEL ADJUSTMENT
7-12. CUE BIAS CURRENT ADJUSTMENT
7-13. REC EQUALIZER ADJUSTMENT
7-14. RECORDING LEVEL ADJUSTMENT
END

6-9. FULL ERASE HEAD REPLACEMENTAND ADJUSTMENT

6-9-1. Replacement

(Removal)
1. Remove the top panel.
2. Unsolder 2 leads on the erase head as shown in figure 6-9-1.
3. Remove the 2 screws (A) and remove the S Base (1) Unit. (Fig. 6-9-1)
4. Remove the screw (B) and remove the head.

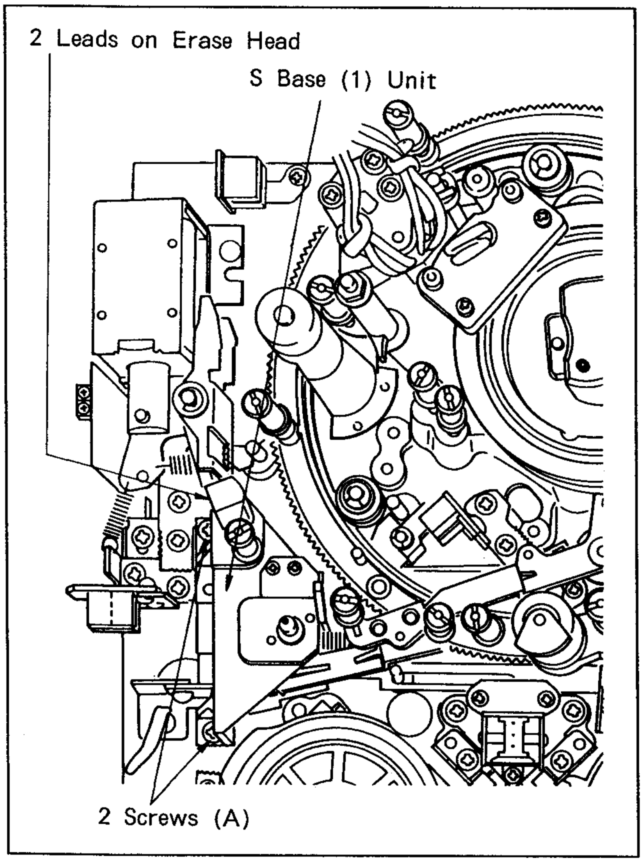

2 Leads on Erase Head
S Base (1) Unit
2 Screws (A)

Fig. 6-9-1

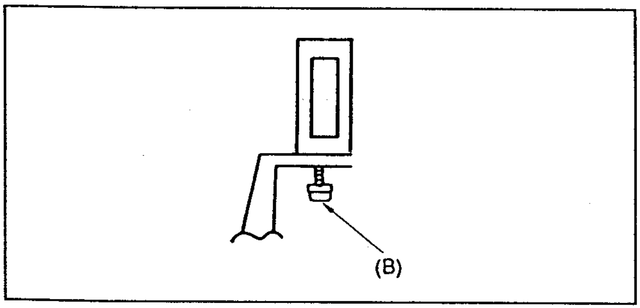


Fig. 6-9-2 Full Erase Head

Installation
1. Follow the previous steps in reverse order.
2. After installing the head, perform the following adjustments.

6-9-2. Adjustment

1. Check and adjustments according to the FULL ERASE CURRENT ADJUSTMENT procedure.

6-10. POST ROLLER UNIT REPLACEMENT

1) POST ROLLER UNIT REPLACEMENT

Note:
When you replace a Post roller unit, install one at a time, and optimize its position.
(Before replacing any more)

(Removal)

1. Remove the front loading unit.
2. Only turn the upper flange counterclockwise and remove the upper flange of the post. (using post driver outer sleeve) Do not loose the hex screw when the upper flange is removed as shown in figure 6-10-1.
3. Remove the post roller unit (B) (Be sure not to lose the post spring (D) as shown in figure 6-10-2.

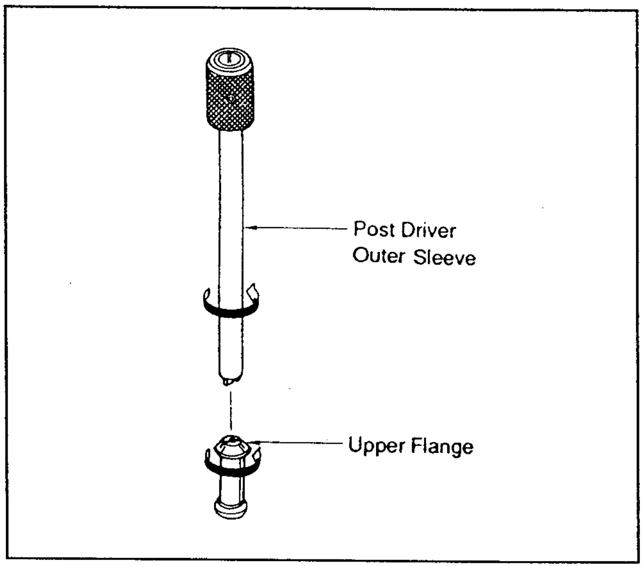

Post Driver
Outer Sleeve
Upper Flange

Fig. 6-10-1 Flange Removal

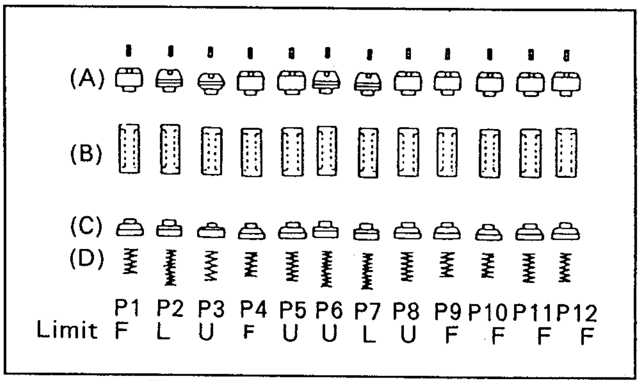

(A)
(B)
(C)
(D)
P1 P2 P3 P4 P5 P6 P7 P8 P9 P10 P11 P12
Limit F L U F U U L U F F F F

Fig. 6-10-2 Each Post Rollers

6-11. CAPSTAN HOUSING UNIT REPLACEMENT AND ADJUSTMENT

6-11-1. Replacement

(Removal)

1. Remove the Shield Plate and L1, L2, L3, L4 P.C.Board, refer to item 1-4.
2. Remove the bottom panel.
3. Remove the 2 screws (A) and remove the Capstan Motor Cover as shown in figure 6-11-2.

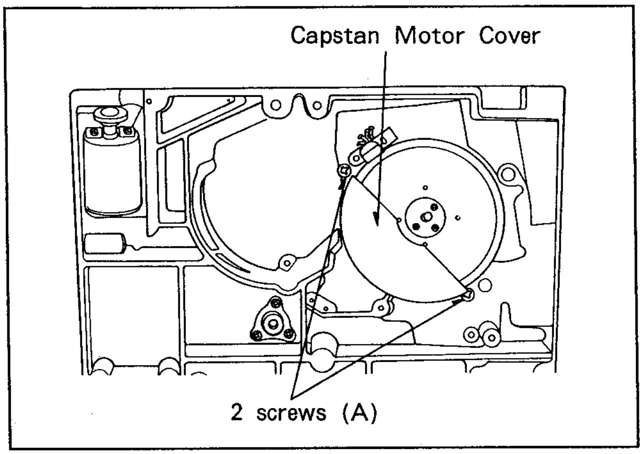

Capstan Motor Cover
2 screws (A)

Fig. 6-11-1 Capstan Motor Cover

4. Loosen the Hex, Screws (B) and remove the Capstan Shaft Holder, Washer, Upper Flange and Spacer as shown in figure 6-11-2.
5. Pull out the Capstan Rotor Unit shown in figure 6-11-2.
6. Unscrew the 3 screws (C) and pull off the Capstan Housing Unit and Lower Flange as shown in figure 6-11-2.

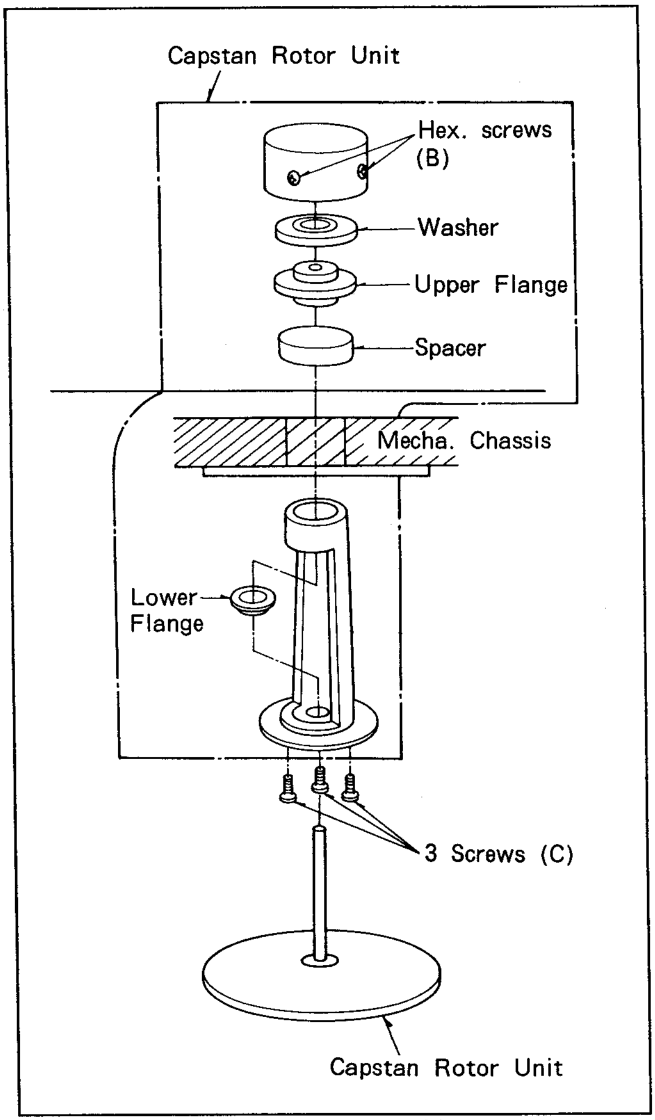

Capstan Rotor Unit
Hex. screws (B)
Washer
Upper Flange
Spacer
Mecha. Chassis
Lower Flange
3 Screws (C)
Capstan Rotor Unit

Fig. 6-11-2 Capstan Motor

(Installation)

1. Follow the previous steps in reverse order.

6-11-2. Adjustment

1. Check adjustments according to the TRACKING FIX ADJUSTMENT procedure.

6-12. PINCH SOLENOID AND PINCH PRESS LEVER REPLACEMENT AND ADJUSTMENT

6-12-1. Pinch Solenoid Replacement

(Removal)

1. Remove the Bottom Plate, L1, L2, L3, L4 P.C.Board and Shield Plate, refer to item 1-2 and 1-4.
2. Disconnect the connector P851 on the Mech. Interface P.C.Board as shown in figure 6-12-1.

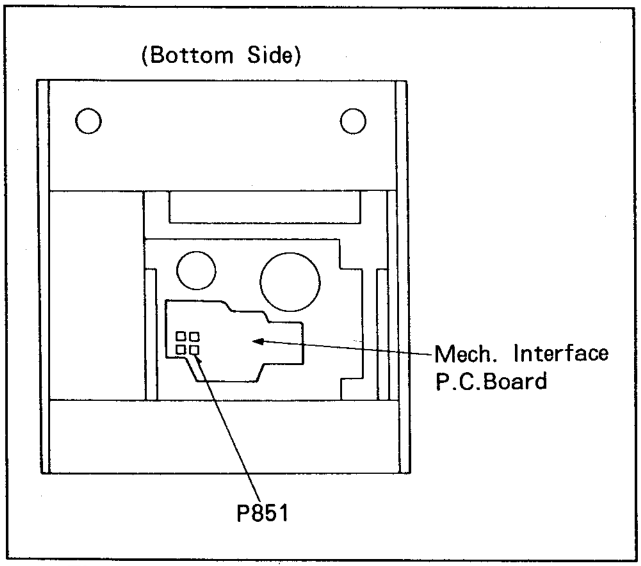

(Bottom Side)
Mech. Interface P.C.Board
P851

Fig. 6-12-1 Pinch Solenoid Connector P851

3. Unscrew the 3 Screws and hand off the Pinch Solenoid as shown in figure 6-12-2.

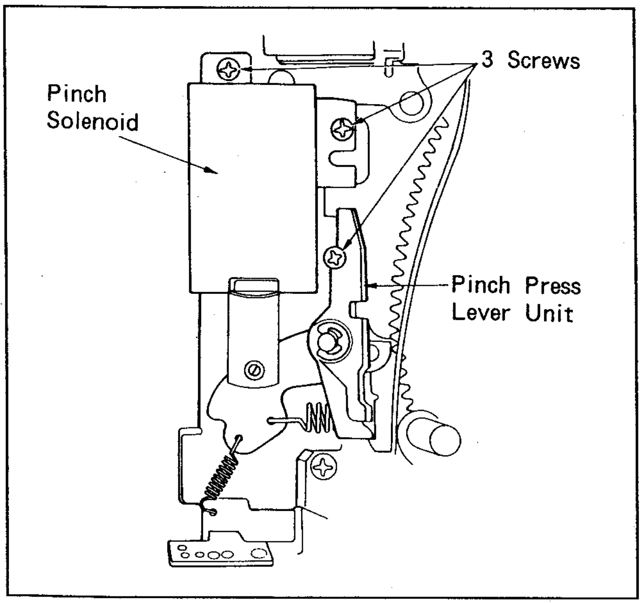

3 Screws
Pinch Solenoid
Pinch Press Lever Unit

Fig. 6-12-2 Pinch Solenoid

(Installation)

1. Follow the removal steps in reverse order.

Note:
Pinch Solenoid Position Adjustment is necessary.

6-12-2. PINCH PRESS LEVER REPLACEMENT

(Removal)

1. Remove the pinch solenoid (refer to pinch solenoid replacement section).
2. Remove the spring as shown in Figure 6-12-3.
3. Remove the E-ring and washer as shown in Figure 6-12-3.
4. Remove the Pinch Press Lever.

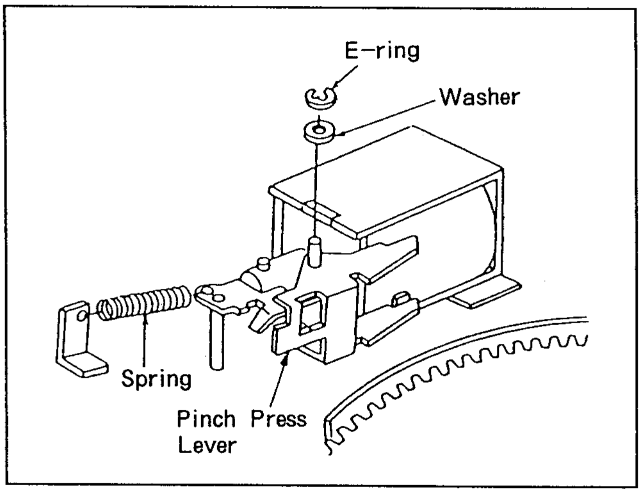

E-ring
Washer
Spring
Pinch Press Lever

Fig. 6-12-3 Pinch Press Lever

(Installation)

1. Install the new Pinch Press Lever and follow the removal steps in reverse order, then the Pinch Pressure Lever position Adjustment is necessary.

6-12-3. PINCH PRESS LEVER POSITION ADJUSTMENT

Tools Required :
Eccentric Screwdriver (VFK0358)

1. In the loading completion and solenoid off condition.
2. Loosen the 2 screw (A) and insert the Eccentric Screwdriver to Hole (B) as shown in figure 6-12-4.
3. Turn the Eccentric Screwdriver so that the clearance (C) is 1.1 +/-0.1mm as shown in figure 6-12-4.
4. Tighten the 2 Screws (A).

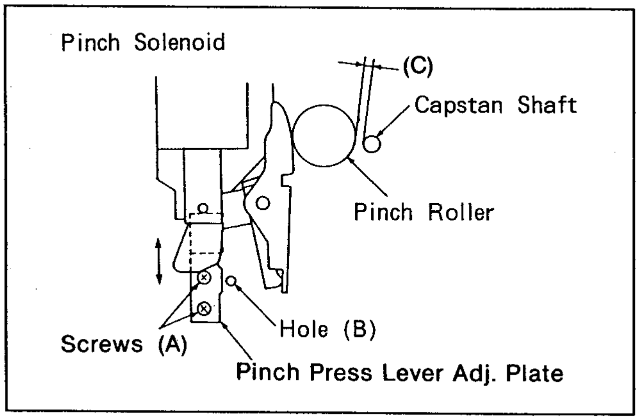

Pinch Solenoid
(C)
Capstan Shaft
Pinch Roller
Hole (B)
Screws (A)
Pinch Press Lever Adj. Plate

Fig. 6-12-4 Pinch Press Lever Adjustment

6-12-4. PINCH SOLENOID POSITION ADJUSTMENT

*Tools Required :
Eccentric Screwdriver (VFK0358)
Fan Type Tension Gauge (VFK66)

1. Remove the front loading (CARRIAGE) unit.
2. Play back a tape and measure the clearance (B) as indicated in figure 6-12-5. Verify that it is 1.3mm ± 0.2mm.
3. If not, loosen the 3 screws (A) (figure 6-12-5) and insert the eccentric screwdriver into hole (C).
4. Adjust the Pinch roller solenoid position with the eccentric screwdriver so that the clearance (B) is 1.3mm (±0.2mm).
5. Tighten the 3 screws (A).
6. Insert a work cassette and play back the tape.
7. Insert a 1.2mm thickness gauge to clearance (B).
8. Place the fan type tension gauge so that it's tip contacts the position (D) as shown in figure 6-12-5.
9. Push the tension gauge in the direction indicated by arrow (E) in figure 6-12-5.
10. Confirm that the placed thickness gauge is dropped when the tension gauge reading is 1450 +/-100 grams.
11. If it is not change the position of the spring as shown in figure 6-12-5.

Note:
When this adjustment is performed, the Pinch Press Lever Adjustment is completed.

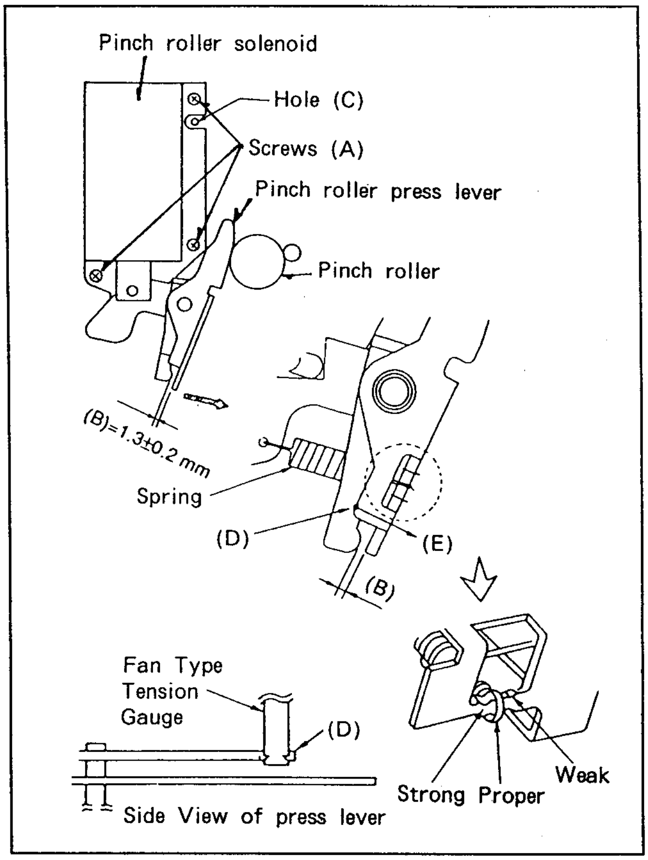

Pinch roller solenoid
Hole (C)
Screws (A)
Pinch roller press lever
Pinch roller
(B)=1.3±0.2mm
Spring
(D)
(E)
(B)
Fan Type Tension Gauge
(D)
Side View of press lever
Strong
Proper
Weak

Fig. 6-12-5 Pinch Roller

6-15. TENSION SPRING PLATE REPLACEMENT

6-15-1. Tension Spring Plate Replacement

(Removal)

1. Remove the top panel.
2. Remove the front loading unit.
3. Loosen the hex. screw (A) and pull off the Tension Arm Unit as shown in figure 6-15-1.

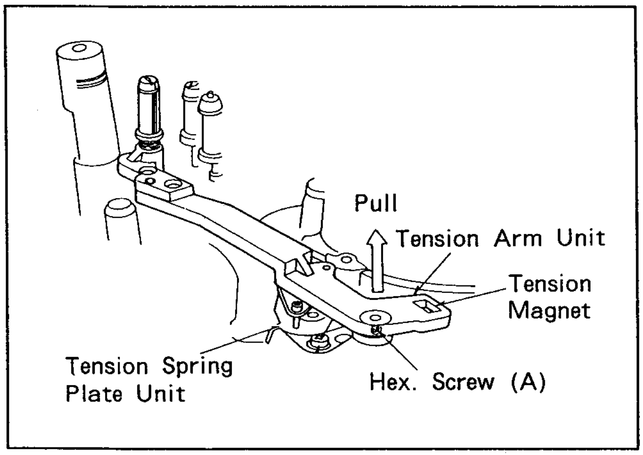

Pull
Tension Arm Unit
Tension Magnet
Tension Spring Plate Unit
Hex. Screw (A)

Fig. 6-15-1 Tension Arm Unit

4. Unscrew the screw (B) and remove the Tension Spring Plate Unit as shown in figure 6-15-2.

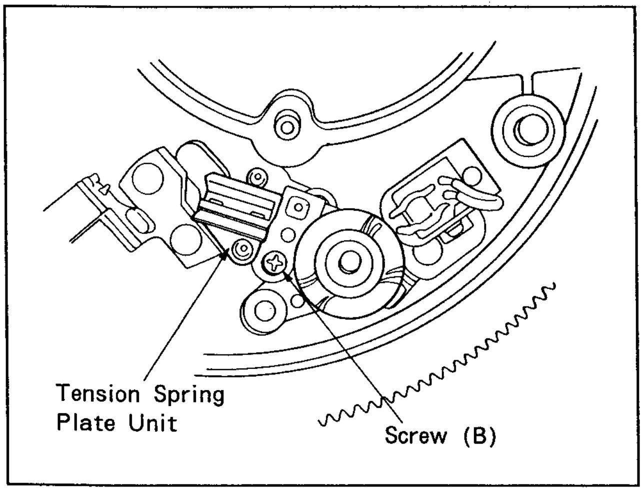

Tension Spring Plate Unit
Screw (B)

Fig. 6-15-2 Tension Spring Plate Unit

(Installation)

1. Follow the previous steps in reverse order.

Note:
After insert the Tension Arm Unit, pushing hold the shaft (C) from bottom side of the mech. In this case, remove the bottom plate and L P.C.Boards. Chassis shown in figure 6-15-3.

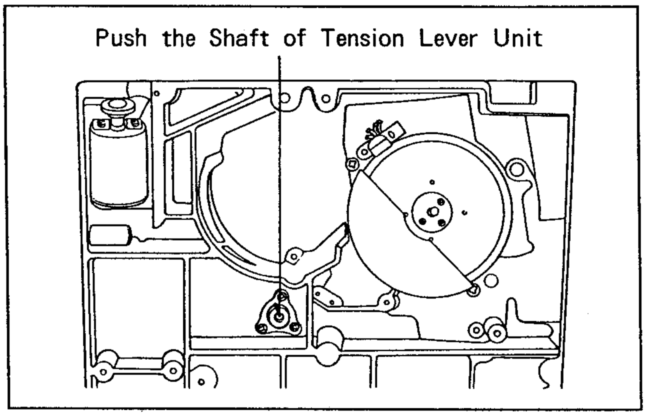

Push the Shaft of Tension Lever Unit

Fig. 6-15-3 Tension Arm Unit Installation

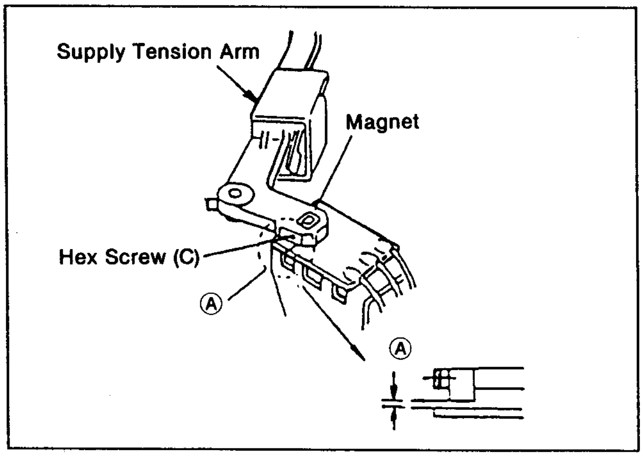
6-5-12. Magnet Adjustment

1. Turn the power off.
2. Remove the cassette compartment.
3. Turn the power on.
4. Set the VTR into Mechanical Test mode.

TEST → MECH → NO FRLD → STOP

(NO FRLD : NO FRONT LOADING)

5. Check the clearance (A) between magnet and sensor. This clearance should be between 0.5 ± 0.1mm.
6. If not, loosen the hex screw (C) and adjust the position of the magnet so that the clearance (A) is within specifications.
7. Tighten the hex screws.


Supply Tension Arm
Magnet
Hex Screw (C)
Ⓐ
Ⓐ

6-16. LOADING MOTOR AND LOADING MOTOR BELT REPLACEMENT

6-16-1. Loading Motor Belt Replacement

(Removal)

1. Remove the top panel (Refer to item 2-1).
2. Remove the Loading Motor Belt to direction (A) as shown in Figure 6-16-1.
3. Direction (A) as shown in Figure 6-16-1.

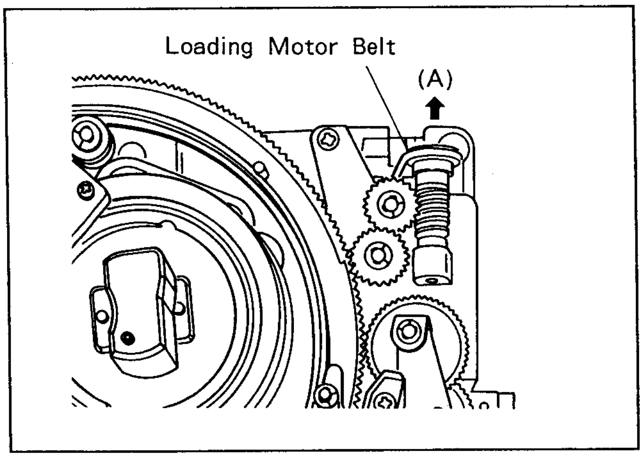


Fig. 6-16-1 Loading Motor Belt Replacement

(Installation)

1. Put new loading belt onto the loading motor first as shown in Figure 6-16-2.
2. Then replace onto the wormgear pulley as shown in Figure 6-16-2.
3. Clean the belt after replacement.
4. Follow the previous steps in reverse order.

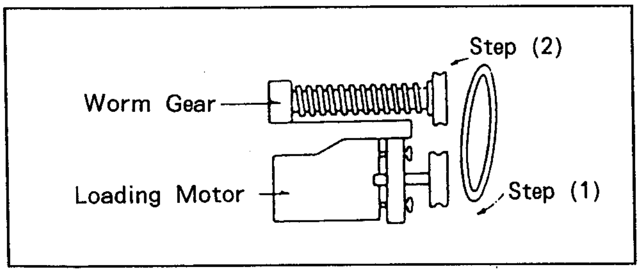


Fig. 6-16-2 Loading Motor Belt Installation

6-16-2. Loading Motor Replacement

(Removal)

1. Remove the top panel.
2. Unscrew the 2 screws (B) and remove the Loading Motor Base Unit with the Loading Motor as shown in Figure 6-16-4.

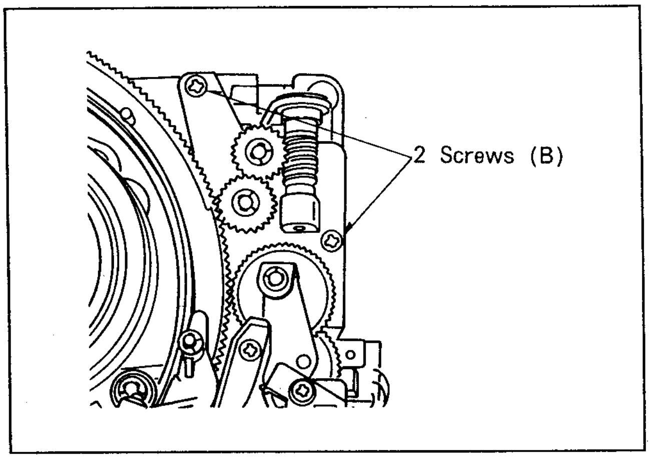


Fig. 6-16-4 Loading Motor Base Removal

3. Remove the bottom panel (Refer to item 2-2).
4. Open the front panel and remove the P.C.Boards from L1 to L4.
5. Unsolder the 2 lead wires on the Loading Motor and unscrew the 2 screws (C), then remove the Loading Motor as shown in Figure 6-16-5.

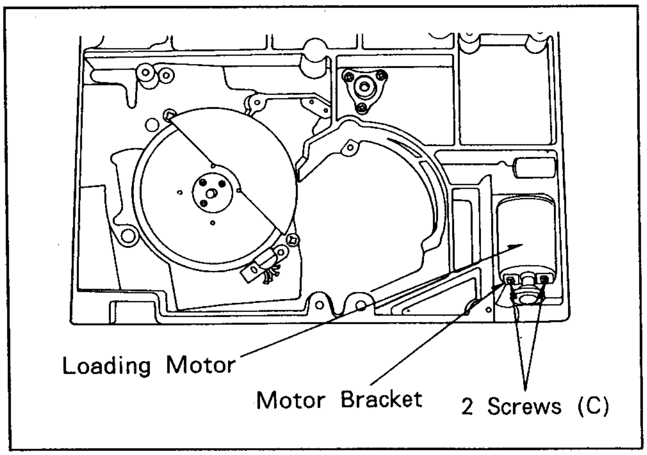


Fig. 6-16-5 Loading Motor Removal

(Installation)

1. Follow the previous steps in reverse order.
2. Check the loading and unloading.

6-17. FRONT LOADING MOTOR REPLACEMENT

(Replacement)

1. Remove the top panel (Refer to item 2-1).
2. Remove the front loading unit (Refer to item 2-3).
3. Unscrew 6 screws (A) and unsolder the 2 soldering portions, then remove the Front Loading Motor Unit and Left Side Plate as shown in Figure 6-17-1.
4. Unscrew the 2 screws (B) and remove the Front Loading Motor Unit as shown in Figure 6-17-1.

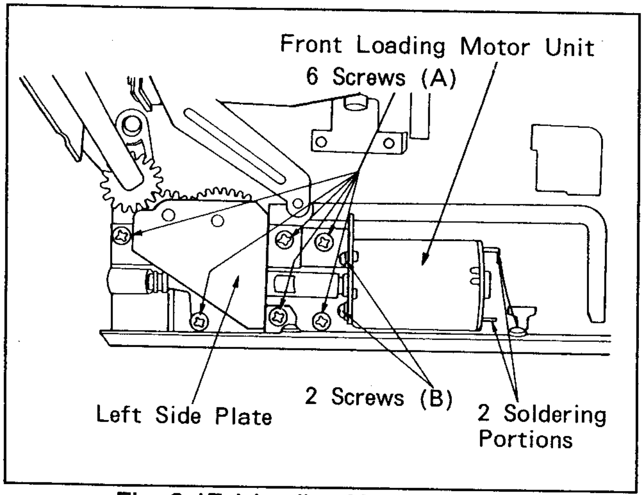

Front Loading Motor Unit
6 Screws (A)
Left Side Plate
2 Screws (B)
2 Soldering Portions

Fig. 6-17-1 loading Motor Removal

(Installation)

1. Follow the previous steps in reverse order.
2. Check the front loading and unloading by using a cassette.

6-18. FAN MOTOR REPLACEMENT (FIELD REPLACEMENT)

(Removal)

1. Unscrew 4 screws (A) and turn open the Rear Panel as shown in Figure 6-18-1.
2. Disconnect the Connector P449 and unscrew 4 screws and Nuts (B) and remove the Fan Motor (small) as shown in Figure 6-18-1.

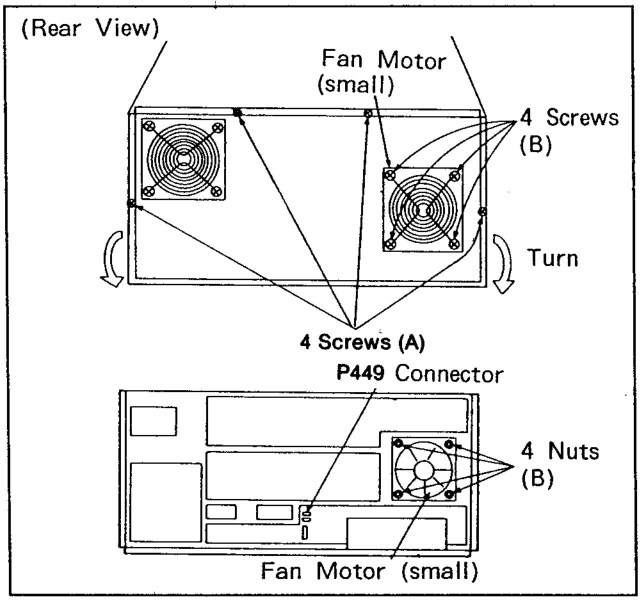

(Rear View)
Fan Motor (small)
4 Screws (B)
Turn
4 Screws (A)
P449 Connector
4 Nuts (B)
Fan Motor (small)

Fig. 6-18-1 Motor Fan Removal (Small)

3. Unscrew the 4 screws (C) and pull out the fan motor from rear jack as shown figure 6-18-2.

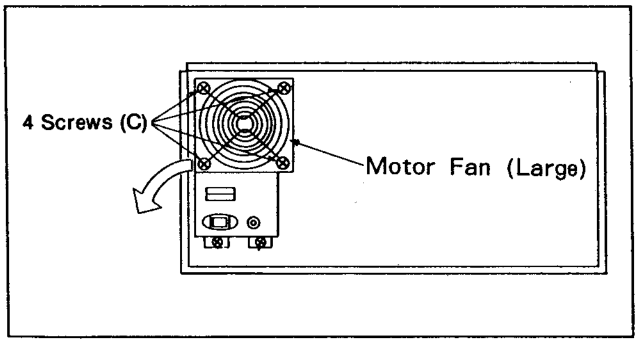
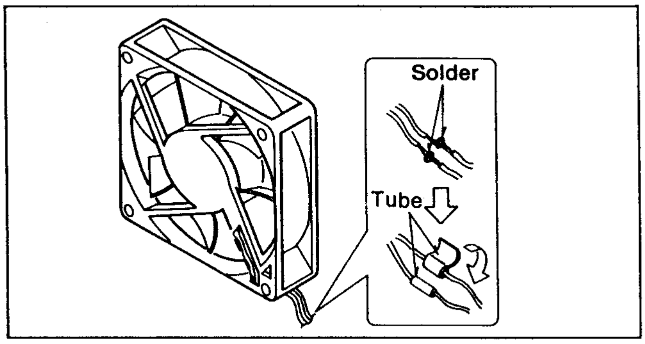

4 Screws (C)
Motor Fan (Large)

Fig. 6-18-3 Fan Motor Removal (Large)

4. Cut the 2 uwires (D) and remove the fan motor as shown in figure 6-8-14.


Solder
Tube

(Installation)

1. Solder the 2 wires of new fan motor with insulation tape as shown in figure 6-18-4.
2. Follow the previous steps in reverse order.

6-19. EJECT SWITCH REPLACEMENT

(Removal)

1. Unscrew the 4 screws (A) and pull the Front Panel Forward as shown in Figure 6-19-1.

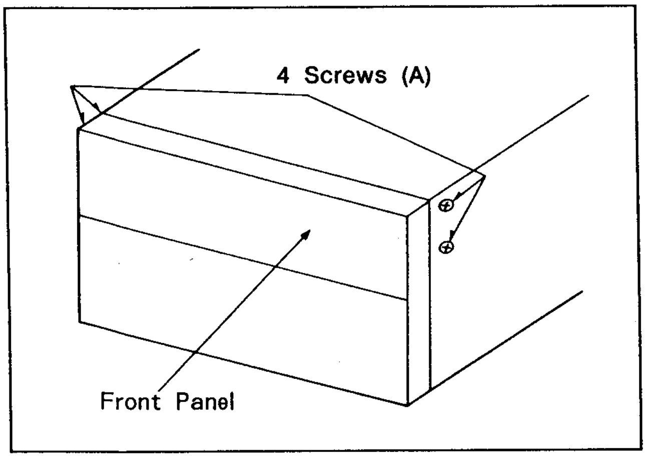

4 Screws (A)
Front Panel

Fig. 6-19-1 Front Panel Removal

2. Unscrew 2 screws (B), then remove the Eject Switch P.C.Board shown in Figure 6-19-2.

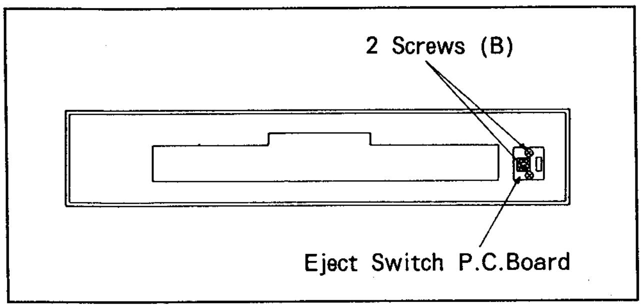

2 Screws (B)
Eject Switch P.C.Board

Fig. 6-19-2 Eject Switch P.C.Board Removal

3. Unsolder the 6 soldering portions as shown in Figure 6-19-3.

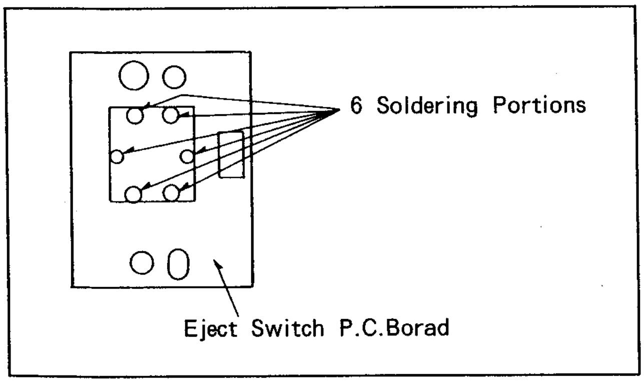

6 Soldering Portions
Eject Switch P.C.Borad

Fig. 6-19-3 Eject Switch Removal

(Installation)

1. Fillow the previous steps in reverse order.

6-20. POWER SWITCH REPLACEMENT

(Removal)

1. Unscrew the 4 screws (A) and pull the Front Panel Forward as shown in Figure 6-20-1.

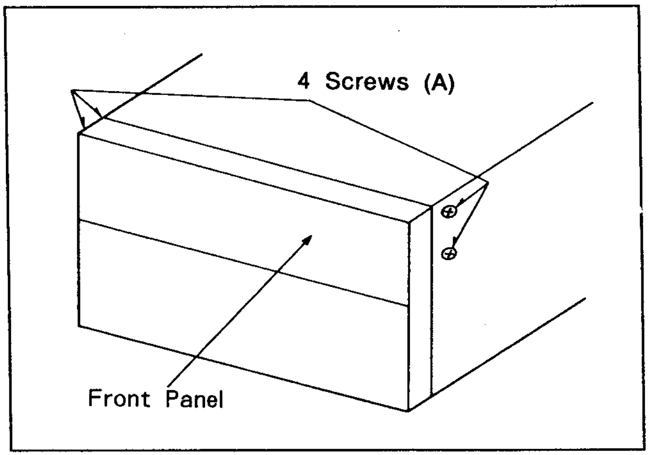

4 Screws (A)
Front Panel

Fig. 6-20-1 Front Panel Removal

2. Unscrew the 3 screws (B) and remove the Power Switch Angle as shown in Figure 6-20-2.

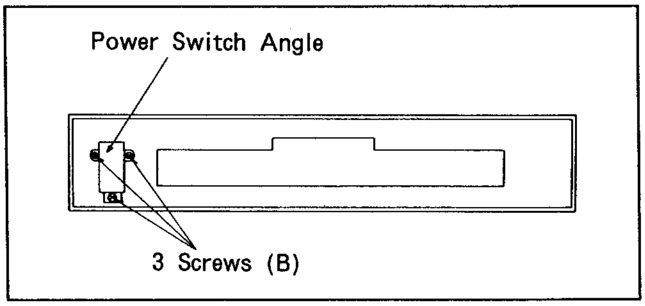

Power Switch Angle
3 Screws (B)

Fig. 6-20-2 Power Switch Angle Removal

3. Unscrew the 2 screws (C) and unsolder the wires as shown in Figure 6-20-3.

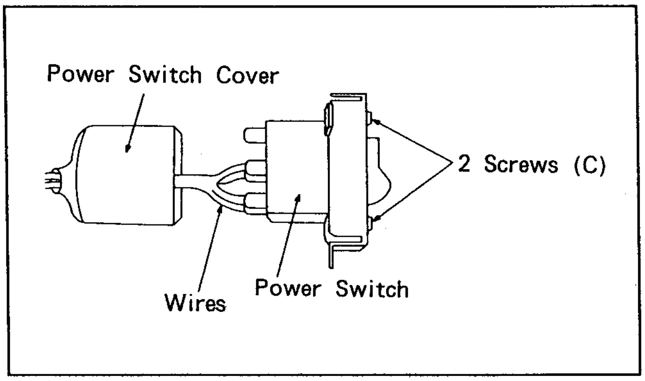

Power Switch Cover
2 Screws (C)
Wires
Power Switch

Fig. 6-20-3 Power Switch Removal

(Installation)

1. Follow the previous steps in reverse order.

6-21. IP BASE UNIT REPLACEMENT

6-21-1. Replacement

(Removal)

1. Remove the top panel (Refer to item 2-1).
2. Loosen the Hex. screw (C) and remove the E-Ring (A), 2 washers (B), IP Base Spring and the IP Base Unit as shown in Figure 6-21-1.

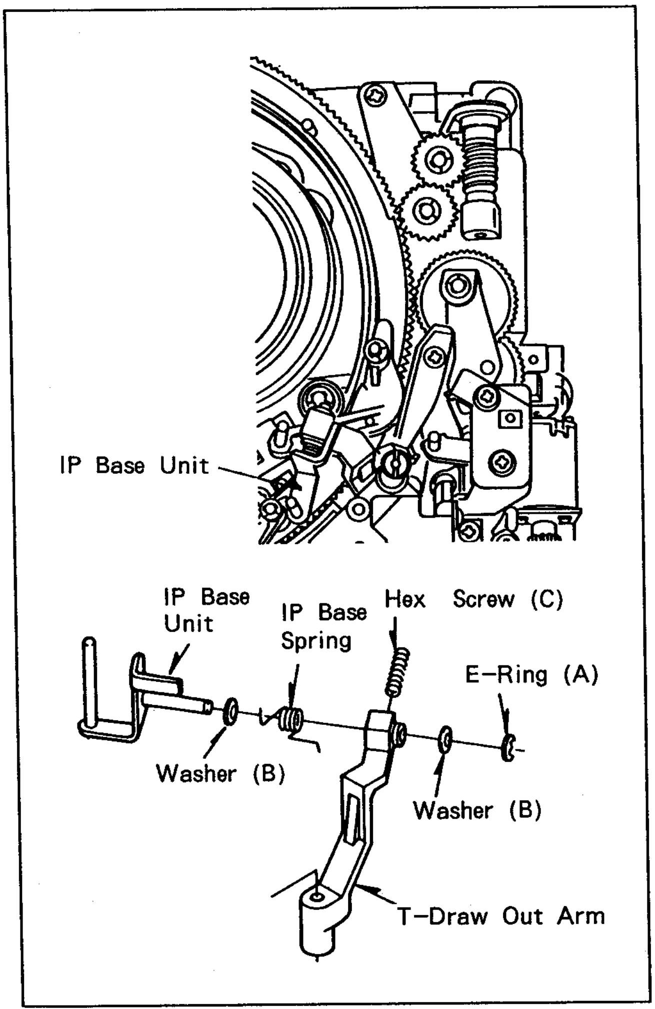

IP Base Unit
IP Base Unit
IP Base Spring
Hex Screw (C)
E–Ring (A)
Washer (B)
Washer (B)
T–Draw Out Arm

Fig. 6-21-1 IP Base Unit Removal

(Installation)

1. Follow the previous steps in reverse order.
2. Adjust the tilt adjustment of the IP Base Unit (Refer to items 5-14, 5-15).

6-22. CAM GEAR REPLACEMENT AND ADJUSTMENT

6-22-1. Replacement

(Removal)

1. Turn the Loading Ring to loading completion.
2. Remove the 3 screws (A) and P12 Post Base as shown in figure 6-22-1.

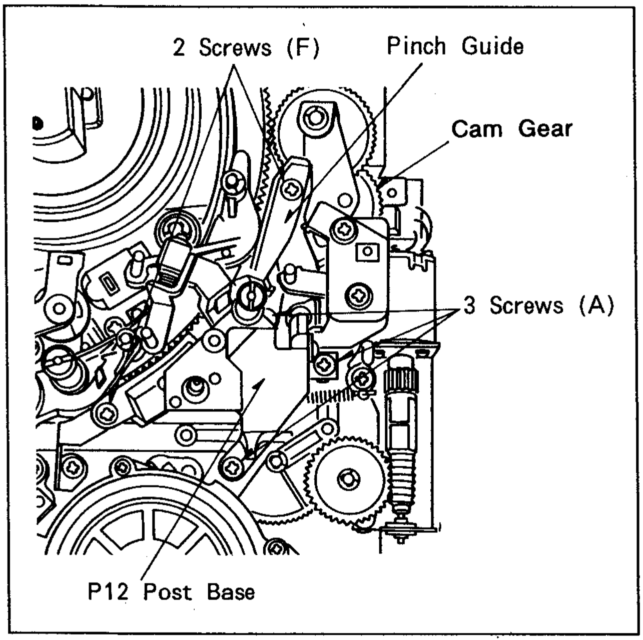

2 Screws (F)
Pinch Guide
Cam Gear
3 Screws (A)
P12 Post Base

Fig. 6-22-1 Cam Gear Removal - (1)

3. Remove the E-Ring (B) and Washer (C), then remove the Slant Drive Angle and Drive Angle, Slant Charge Spring as shown in figure 6-22-2.
4. Remove the E-Ring (D), Washer (E) and the Drive Plate Unit as shown in figure 6-22-2.

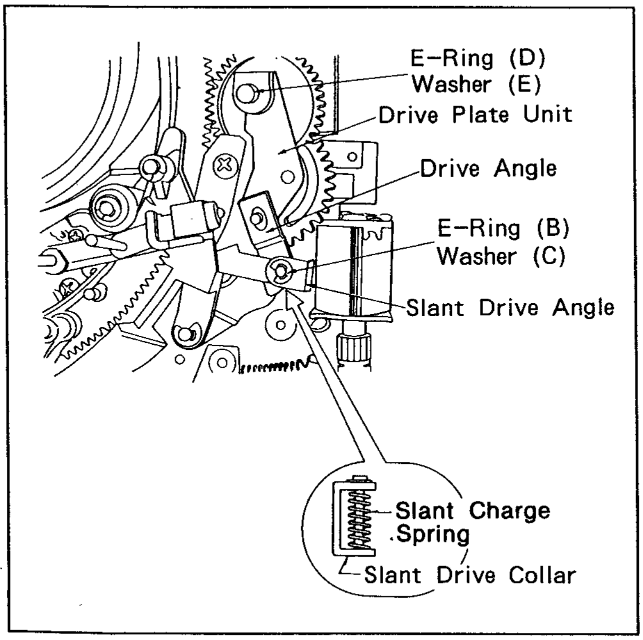

E-Ring (D)
Washer (E)
Drive Plate Unit
Drive Angle
E-Ring (B)
Washer (C)
Slant Drive Angle
Slant Charge Spring
Slant Drive Collar

Fig. 6-22-2 Cam Gear Removal - (2)

5. Unscrew the 2 screws (F) and remove the Pinch Guide (Plastic) as shown in figure 6-22-1.
6. Remove the screw (G) and remove the Pinch Guide Bracket as shown in figure 6-22-3.
7. Remove the Intermediate Gear, E-Ring (H), Washer (I) and the Cam Gear as shown in figure 6-22-3.

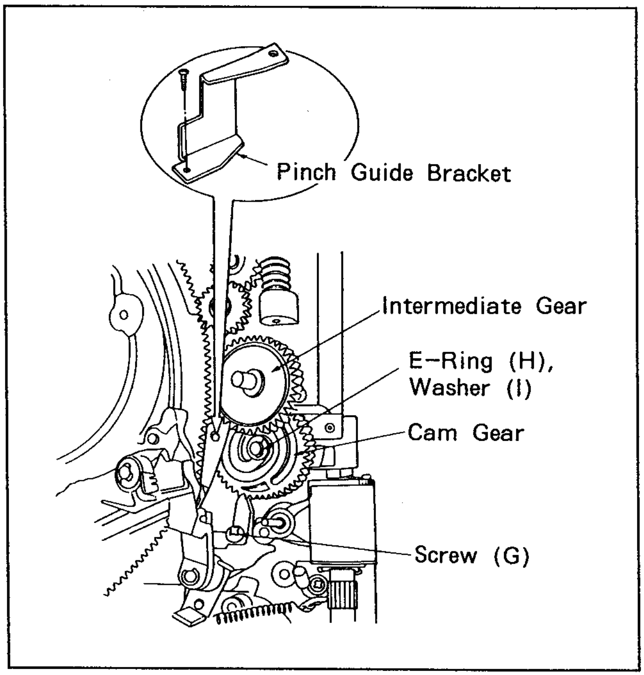

Pinch Guide Bracket
Intermediate Gear
E-Ring (H),
Washer (I)
Cam Gear
Screw (G)

Fig. 6-22-3 Cam Gear Removal - (3)

(Installation)

1. Follow the previous steps in reverse order, then Cam Gear Phase Adjustment should be performed, refer to follows.

6-22-2. Cam Gear Phase Adjustment

1. Install the Intermediate Gear and the Cam Gear, then the holes a, b should be matched with the holes a' of the Intermediate Gear and b' of the Cam Gear as shown in figure 6-22-4.
2. Install the Drive Plate then the pin of the Drive Plate should be matched with the groove position C of the Cam Gear as shown in figure 6-22-4.

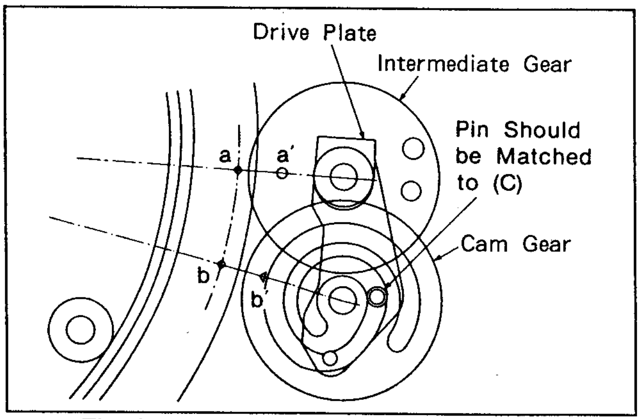

Drive Plate
Intermediate Gear
Pin Should be Matched to (C)
a
a'
Cam Gear
b
b'

Fig. 6-22-4 Cam Gear Phase Adjustment

6-23. RING ROLLER UNIT REPLACEMENT

(Removal)

1. Unscrew the 2 screws (A) and remove the Ring Loller Unit as shown in figure 6-23-1.

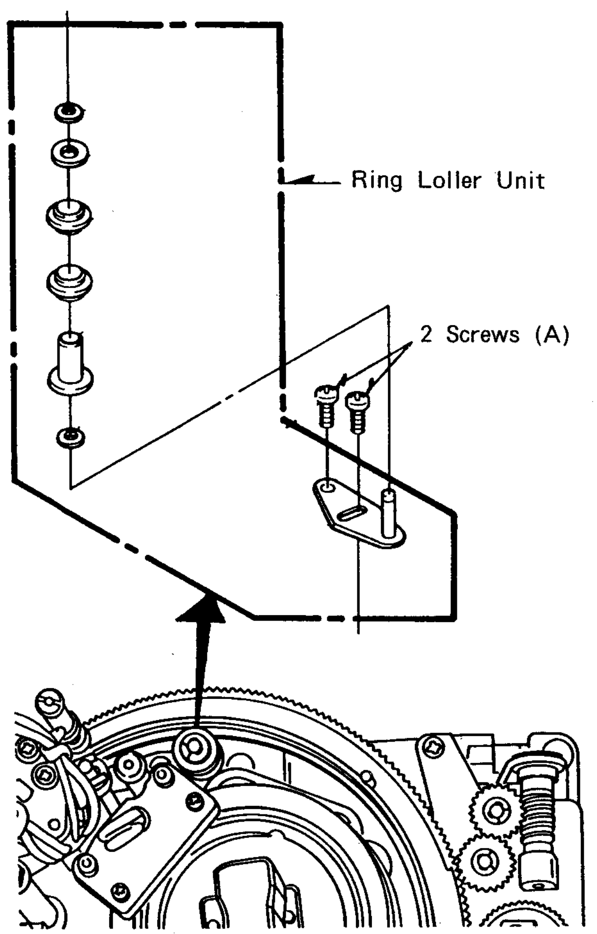

Ring Loller Unit
2 Screws (A)

Fig. 6-23-1 Ring Loller Unit Removal

(Installation)

1. Install the Ring Loller Unit and tighten the 2 screws (A) as shown in figure 6-23-1.

6-24. SUB LOADING MOTOR REPLACEMENT

(Removal)

1. Remove the top panel (Refer to item 2-1).
2. Remove the front loading unit (Refer to item 2-3).
3. Remove the E-Ring (A), Washer (B), Decrease Gear, 2 screws (C) and the T-Arm Reset Spring, then remove the Sub Loading Motor Unit as shown in figure 6-24-1.
4. Unsolder the wires (D) and unscrew the 2 screws (E), then remove the Sub Loading Motor as shown in figure 6-24-1.

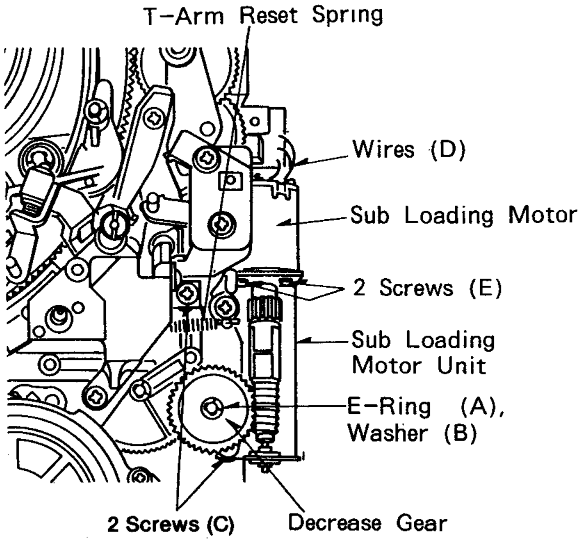

T–Arm Reset Spring
Wires (D)
Sub Loading Motor
2 Screws (E)
Sub Loading Motor Unit
E–Ring (A), Washer (B)
2 Screws (C)
Decrease Gear

Fig. 6-24-1 Sub Loading motor Removal

(Installation)

1. Follow the previous steps in reverse order.

6-25. STOPPER SOLENOID REPLACEMENT AND ADJUSTMENT

6-25-1. Replacement

(Removal)

1. Remove the bottom plate (Refer to item 2-2).
2. Remove the L boards from L1 to L4.
3. Unscrew the 2 screws (A) and remove the Solenoid Holder as shown in figure 6-25-1.
4. Unsolder the lead wires on the stopper solenoid.
5. Unscrew the 2 screws (B) and remove the Stopper Solenoid as shown in figure 6-25-1.

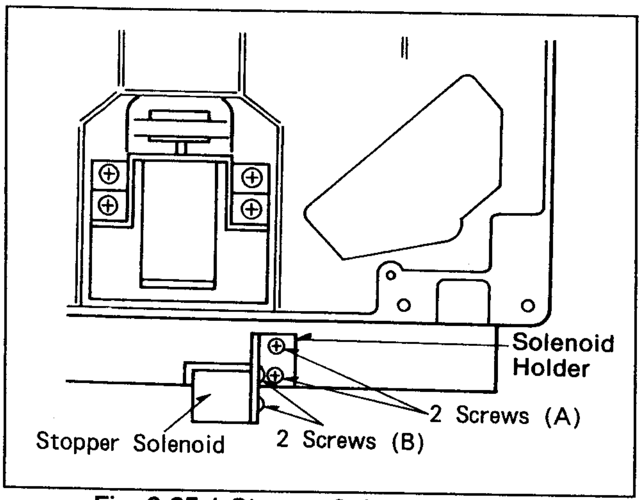


Fig. 6-25-1 Stopper Solenoid Removal

(Installation)

1. Follow the previous steps in reverse order, then the Stopper Solenoid position should be adjusted as follows.

6-25-2. Stopper Solenoid Position Adjustment

1. The Reel Base Unit should be on the small cassette position.
2. Loosen the 2 screws (B), move the Stopper Solenoid to direction (C) so that the clearance (D) is 0.2 +/-0.1mm.

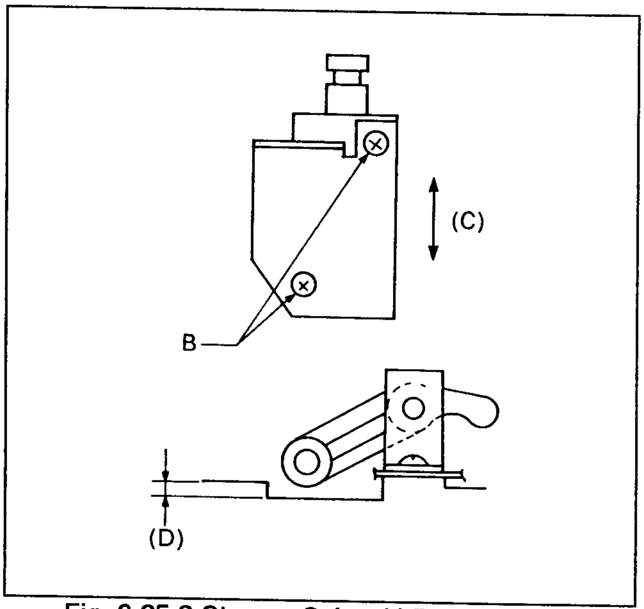


Fig. 6-25-2 Stopper Solenoid Position Adjustment

6-26. WORM MOTOR UNIT REPLACEMENT (Reel Position Change Motor)

(Removal)

1. Remove thte bottom panel (Refer to item 2-2).
2. Remove the L P.C.Boards from L1 to L4.
3. Unsolder the read wires of the Worm Motor Unit.
4. Unscrew the 2 screws (A) and remove the Timing Belt and the Worm Motor Unit as shown in figure 6-26-1.

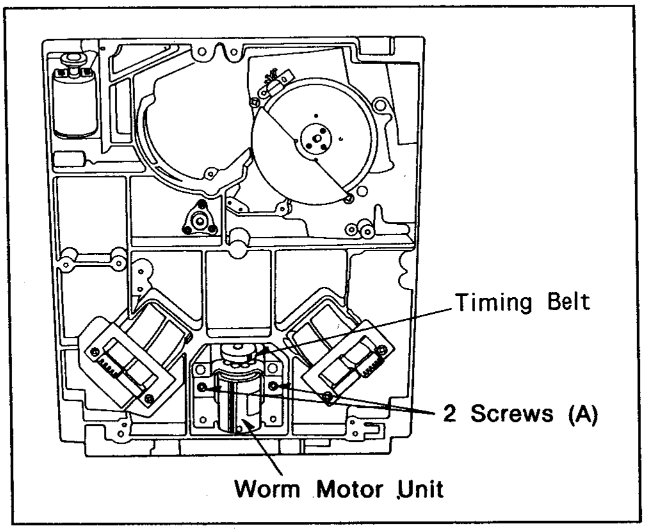


Fig. 6-26-1 Worm Motor Unit Removal

(Installation)

1. Follow the previous steps in reverse order.

6-27. LOADING/UNLOADING, SUB LOADING/SUB UNLOADING COMPLETION SWITCHES POSITION ADJUSTMENT

*Tools Required :
Fine Adj. Driver

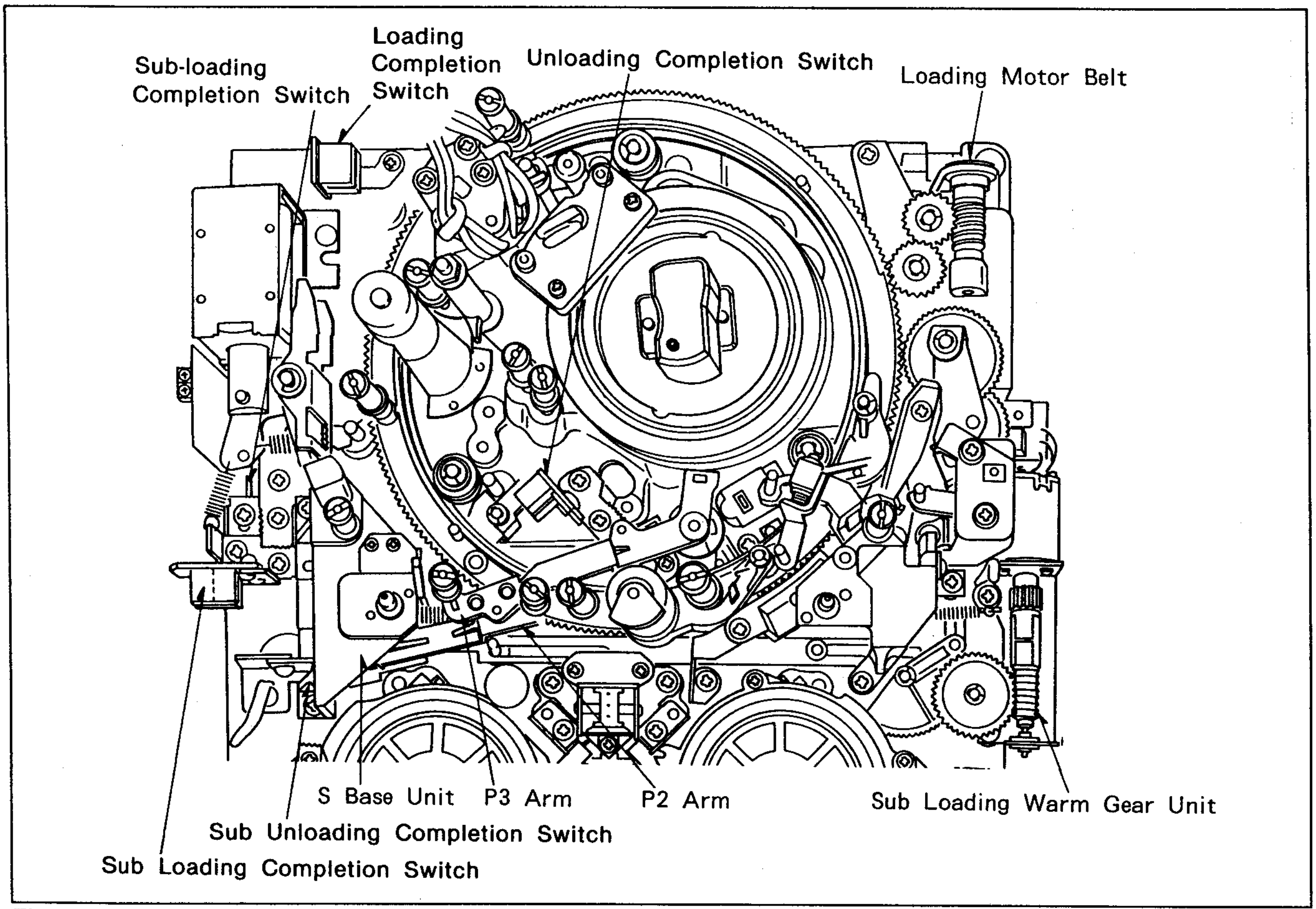

Sub-loading Completion Switch
Loading Completion Switch
Unloading Completion Switch
Loading Motor Belt
S Base Unit
P3 Arm
P2 Arm
Sub Loading Warm Gear Unit
Sub Unloading Completion Switch
Sub Loading Completion Switch

Fig. 6-27-1 Loading/Unloading, Sub Loading/Sub Unloading Completion Switch

1. Remove the top panel (Refer to item 2-1).
2. Turn the Loading Motor Belt to loading completion.
3. Loosen the 2 screws (A).
4. Insert the Fine Adj. Driver to the hole (B).
5. Turn the Fine Adj. Driver so that the clearance (C) is 1.8+/-0.2mm.
6. Tighten the 2 screws (A).
7. Turn the Loading Motor Belt to unloading completion.
8. Loosen the 2 screws (D).
9. Insert the Fine Adj. Driver to the hole (E).
10. Turn the Fine Adj. Driver so that the clearance (F) is 1.8+/-0.2mm.
11. Tighten the 2 screws (D) and remove the front loading unit (Refer to item 2-3).

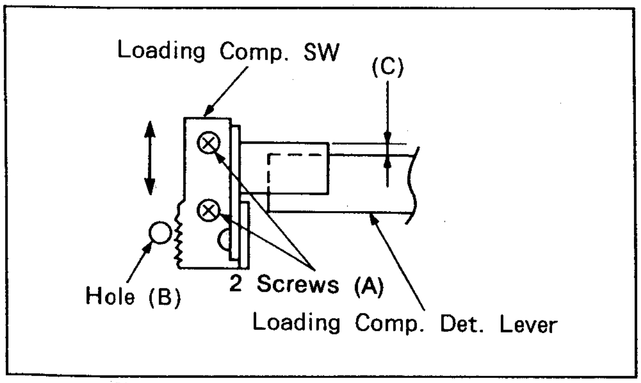

Loading Comp. SW
(C)
Hole (B)
2 Screws (A)
Loading Comp. Det. Lever

Fig. 6-27-2 Loading Completion SW

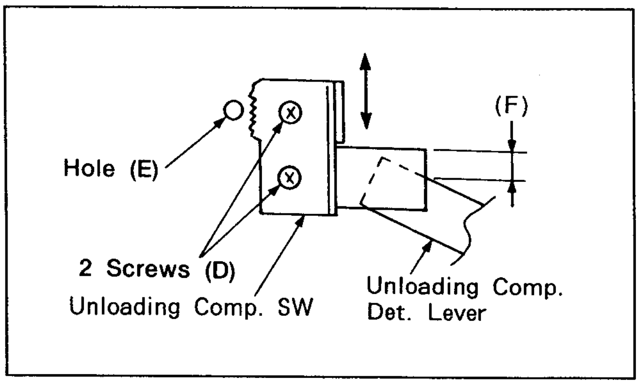

Hole (E)
(F)
2 Screws (D)
Unloading Comp. SW
Unloading Comp. Det. Lever

Fig. 6-27-3 Unloading Completion SW

12. Turn the Sub Loading Warm Gear Unit so that the P2 Arm just contacts with the S Base Unit as shown in figure 6-27-1.
13. Loosen the 2 screws (G).
14. Insert the Fine Adj. Driver to the hole (H).
15. Turn the Fine Adj. Driver so that (I) is 1+/- 0.2mm.
16. Tighten the 2 screws (G).

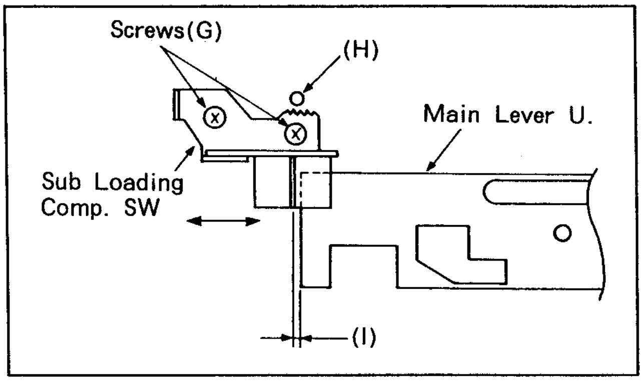

Screws(G)
(H)
Main Lever U.
Sub Loading
Comp. SW
(I)

Fig. 6-27-4 Sub Loading Completion SW

17. Turn the Sub Loading Warm Gear Unit by 1-1.5 rotation from the position that the P2 Arm contacts with the P3 Arm.
18. Loosen the 2 screws (J).
19. Insert the Fine Adj. Driver to the hole (K).
20. Turn the Fine Adj. Driver so that (L) is 2+/- 0.2mm.
21. Tighten the 2 screws (J).
22. Reinstall the front loading unit.

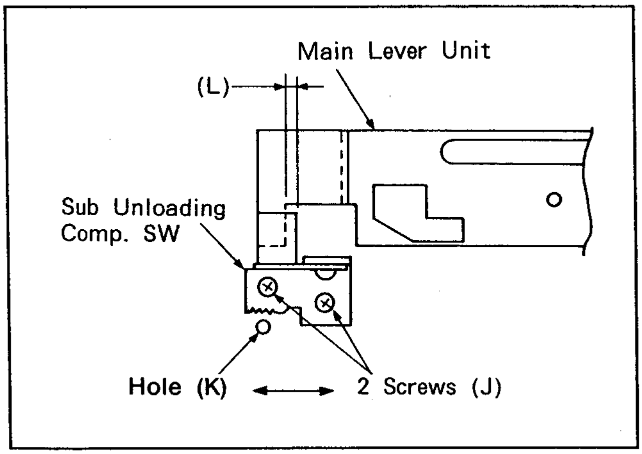

Main Lever Unit
(L)
Sub Unloading
Comp. SW
Hole (K)
2 Screws (J)

Fig. 6-27-5 Sub Unloading Completion SW

6-27-1. Sub Loading Conpletion SW Adjustment

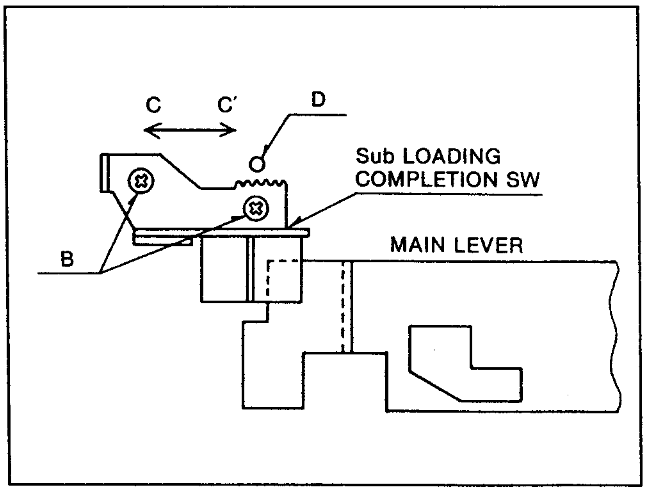
SPEC	FG COUNTER 70~73(on the FRONT PANEL)
TEST	FRONT DISPLAY
MODE	EJECT → LOADING COMPLETION
TAPE	THE END OF L CASSETTE (180mm)
M.EQ	
INPUT	
ADJ.	HOLE D

<STEP 1>

1. Open the TEST MECHA menu.
2. Insert the L cassette wound to the end.
3. Check the FG counter whether it is within spec. or not.
4. If not, adjust the Sub loading completion SW position following <STEP 2>.
5. If within spec. confirm twice more.

<STEP 2>

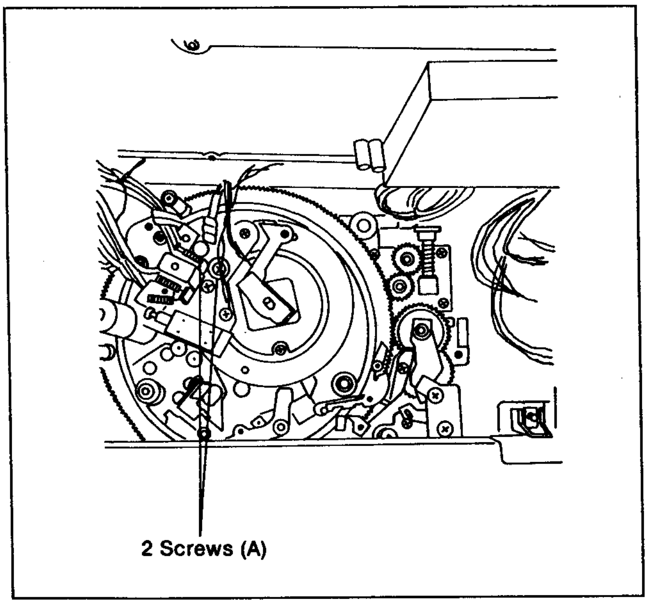
1. Loosen the screws B.
2. Insert the Gear driver to the hole D and adjust the position.
3. After adjustment tighten the screws B.
4. Check the <STEP 1> again.


C
C'
D
Sub LOADING
COMPLETION SW
MAIN LEVER
B

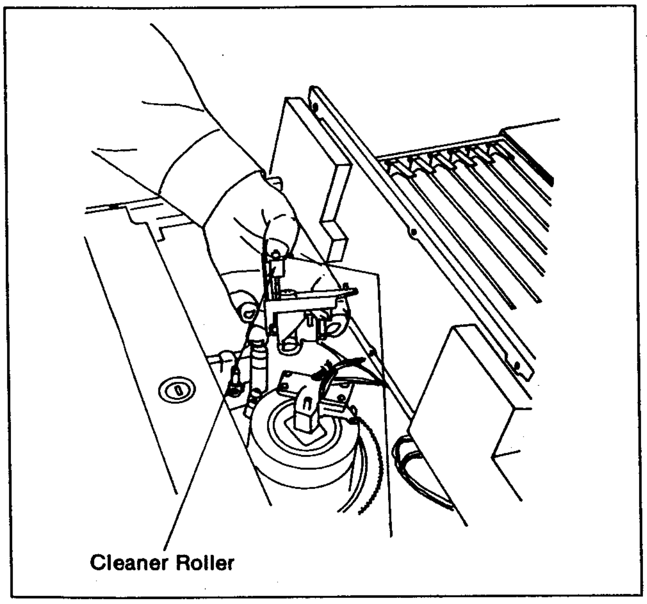
6-28. CLEANER ROLLER REPLACEMENT

(Removal)

1. Remove the top panel (Refer to item 2-1).
2. Unscrew the 2 screws (A) and remove the cleaner unit as shown below.



3. Push the cleaner roller by hand and remove the roller stopper as shown below.



(Installation)

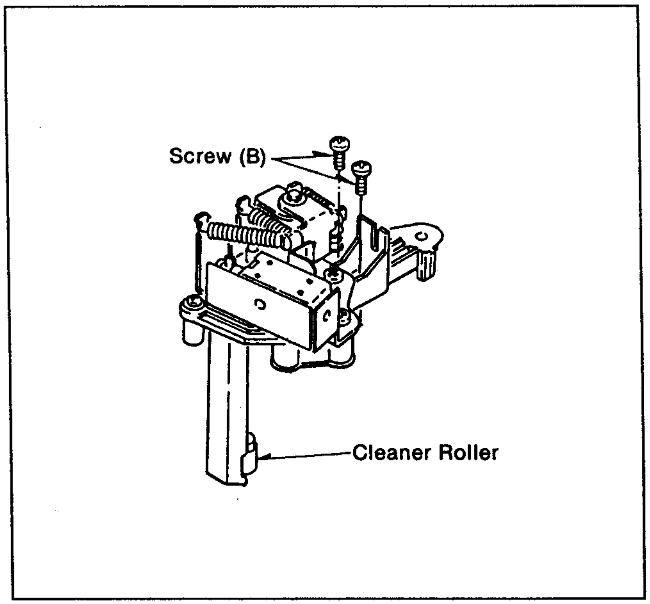
1. Follow the previous steps in remove order.

6-29. CLEANER SOLENOID REPLACEMENT AND ADJUSTMENT

6-29-1. CLEANER SOLENOID REPLACEMENT

(Removal)

1. Remove the top panel (Refer to item 2-1).
2. Unscrew the 2 screws (A) and remove the cleaner unit (Refer to item 6-28).
3. Unscrew the 2 screws (B) and remove the cleaner solenoid unit as shown below.



4. Unsolder the 2 wires and remove the cleaner solenoid.

(Installation)

1. Follow the previous steps in reverse order.
2. Position adjustment should be performed as follows.

6-29-2. CLEANER SOLENOID ADJUSTMENT

Toll Required :
Eccentric Screwdriver (VFK0358)

1. Push the solenoid to the arrow direction by hand.
2. Confirm that the clearance (A) is center position as shown in figure 6-29-2.
3. If it is not, loosen the 2 screws (B) and insert an eccentric screwdriver into hole (C).
4. Adjust the cleaner solenoid position with the eccentric screwdriver so that the clearance (A) is 0.3mm ~ 0.4mm.
5. Tighten the 2 screws (B).

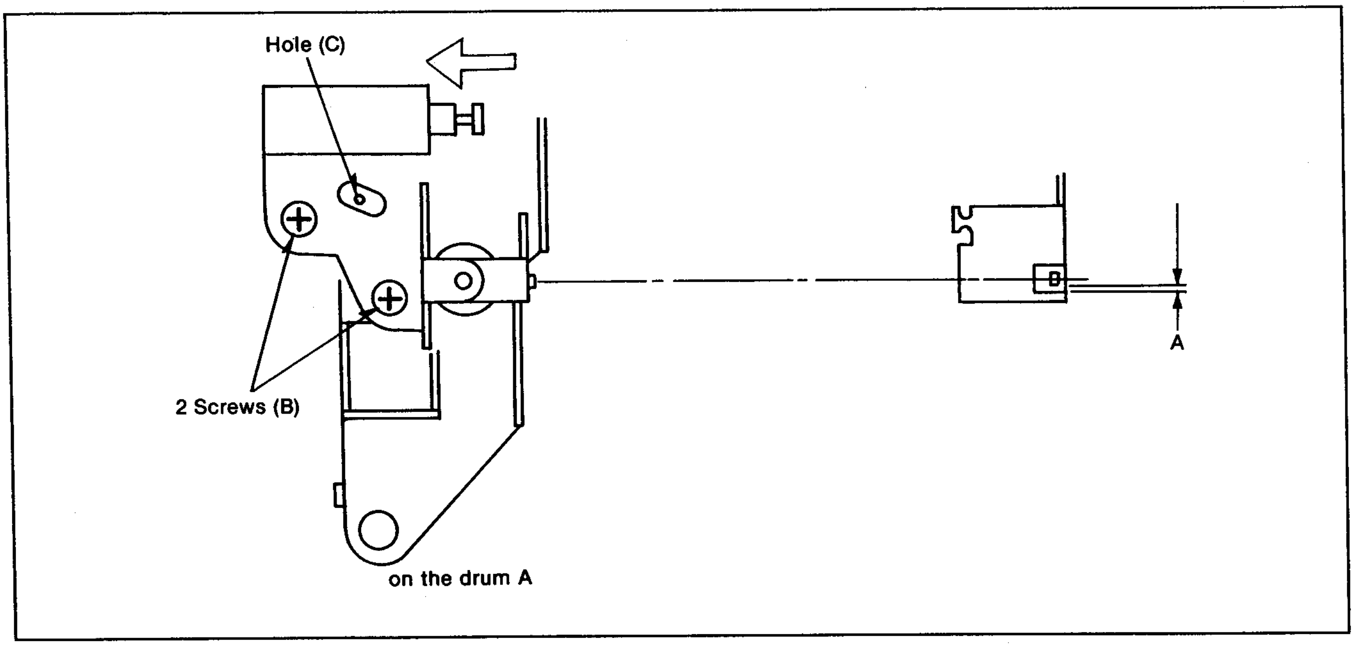


Fig. 6-29-2 Cleaner Solenoid Position Adjustment

6-30. SUPPLY REEL TABLE AND TAKE UP REEL REPLACEMENT AND ADJUSTMENT

6-30-1. REPLACEMENT

1. Remove the top panel (Refer to item 2-1).
2. Remove the front loading unit (Refer to item 2-3).
3. Remove the E-rings (A) and washers (B) and pull out the supply reel table and take up reel table.

Note : Be careful drop the reel table down. Because some damage are appeared to bearing in the reel table by it.

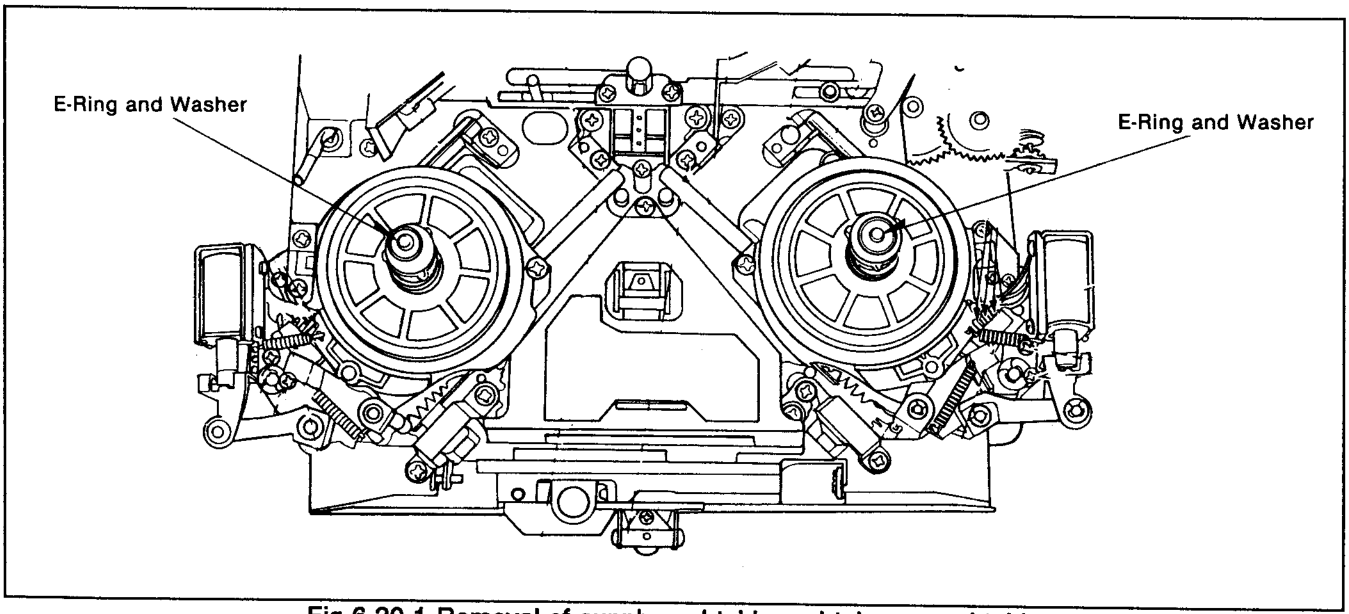


Fig 6-30-1 Removal of supply reel table and take up reel table

(Installation)

1. Install the reel tqables following the previous steps in reverse order.
2. Reel height adjustment should be performed as follows.

6-30-2. ADJUSTMENT (FACTORY ADJUSTMENT)

Tool Required :
Reel Height Adjustment Tool (VFK0772)

1. Remove the top panel (Refer to item 2-1).
2. Remove the front loading unit (Refer to item 2-3).
3. Install the Mech. neutral adjustment plate on the reel table correctly.
4. Set the reel height adjustment tool on the reel table as shown in figure 6-30-2.

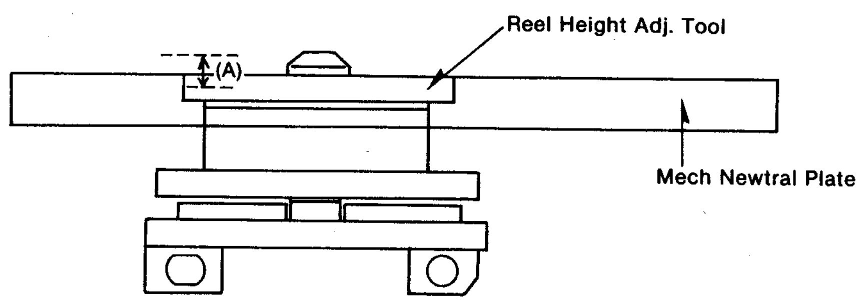


Fig 6-30-2 Reel Height Adjustment

5. Confirm that the A position is flat as shown in figure 6-30-2.
6. If it is low position, install the washer (XWGV4Z7G or XWGV4Y7G) between the reel base and reel table.
7. If it is high position, remove the washer between the reel base and reel table.

6-31. CASSETTE IN SW ADJUSTMENT

1. Remove the Front Loading unit (Refer to item 2-3)
2. Insert a L cassette untill touching to the kick lever as shown in Figure 6-31-1.
3. Loosen two screws (A) and insert the eccentric screwdriver into hole (b).
4. Adjust SW position so that the gap "T" is 0mm ~ 0.5mm.
5. Tighten two screws (A).

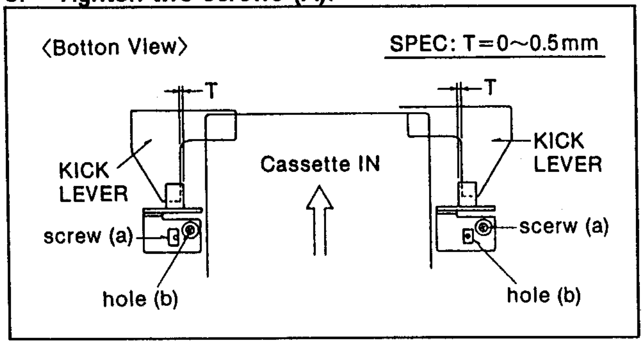

‹Botton View›
SPEC: T=0~0.5mm
T
T
KICK LEVER
Cassette IN
KICK LEVER
screw (a)
scerw (a)
hole (b)
hole (b)

Fig. 6-31-1

6-32. V PHOTO SW ADJUSTMENT

1. Remove the Front Loading unit (Refer to item 2-3)
2. Insert a screwdriver (negative) into hole (A)(worm gear) and rotate clockwise until cassette holder is down condition as shown in Figure 6-32-1.
3. Loosen a screw (A) and insert a eccentric screwdriver into hole (b).
4. Adjust SW position so that the GAP "T" is 0mm ~ 0.5mm as shown in Figure 6-32-2.
5. Tighten a screw (A).

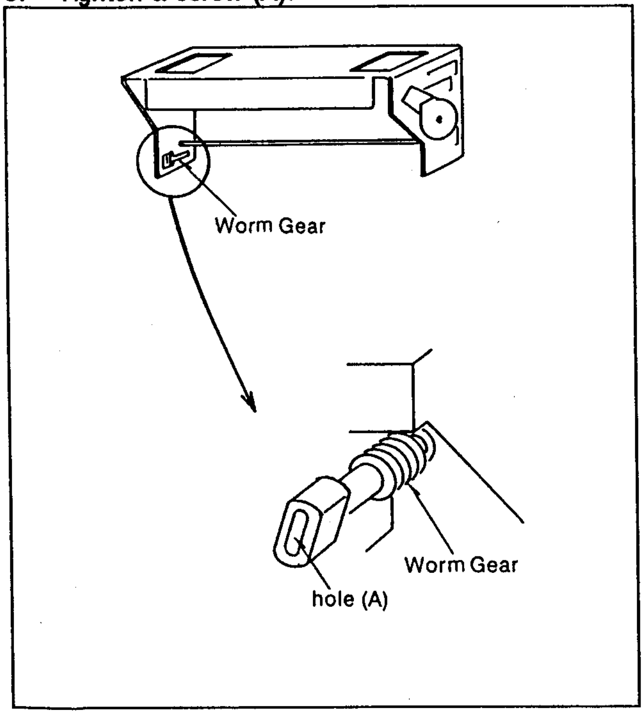

Worm Gear
Worm Gear
hole (A)

Fig. 6-32-1

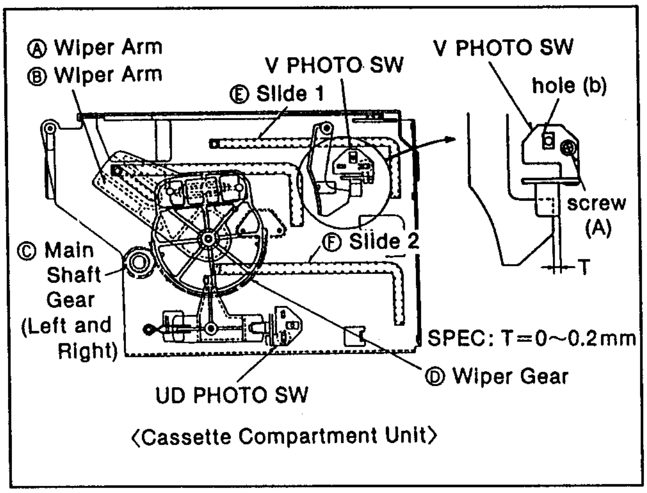

Ⓐ Wiper Arm
Ⓑ Wiper Arm
V PHOTO SW
Ⓔ Slide 1
V PHOTO SW
hole (b)
screw (A)
T
Ⓒ Main Shaft Gear (Left and Right)
Ⓕ Slide 2
SPEC: T=0~0.2mm
Ⓓ Wiper Gear
UD PHOTO SW
‹Cassette Compartment Unit›

Fig. 6-32-2

6-33. UD PHOTO SW ADJUSTMENT

1. Remove theFront Loading unit (Refer to item 2-3)
2. Rotate the worm gear clockwise until gap "T" is 1.5mm ± 0.2mm as shown in Figure 6-33-1.
3. Loosen a screw (A) and insert a eccentric screwdriver into hole (b).
4. Adjust SW position so that the "T₁" is 1.5mm ± 0.1mm as shown in Figure 6-33-2.
5. Tighten a screw (A).

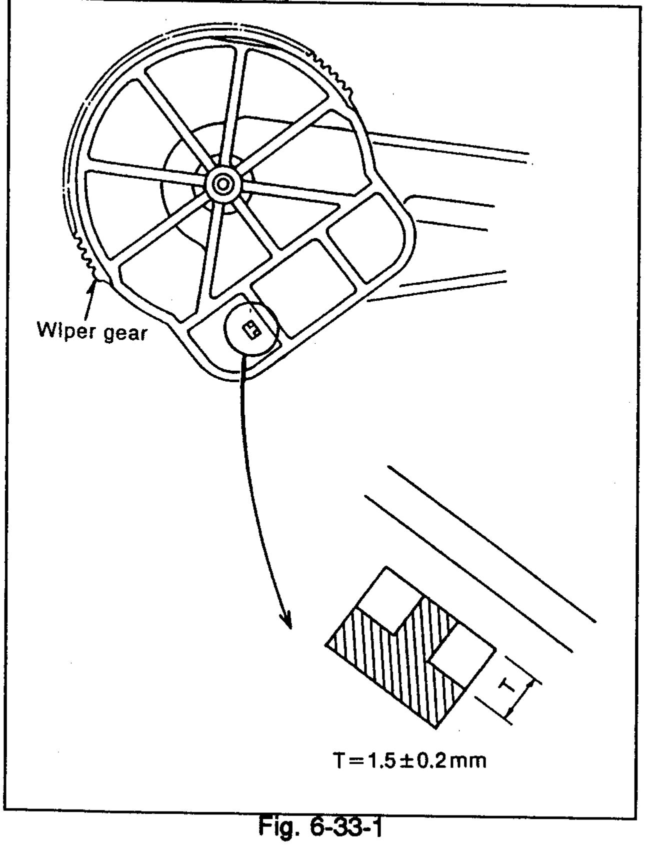

Wiper gear
T
T=1.5±0.2mm

Fig. 6-33-1

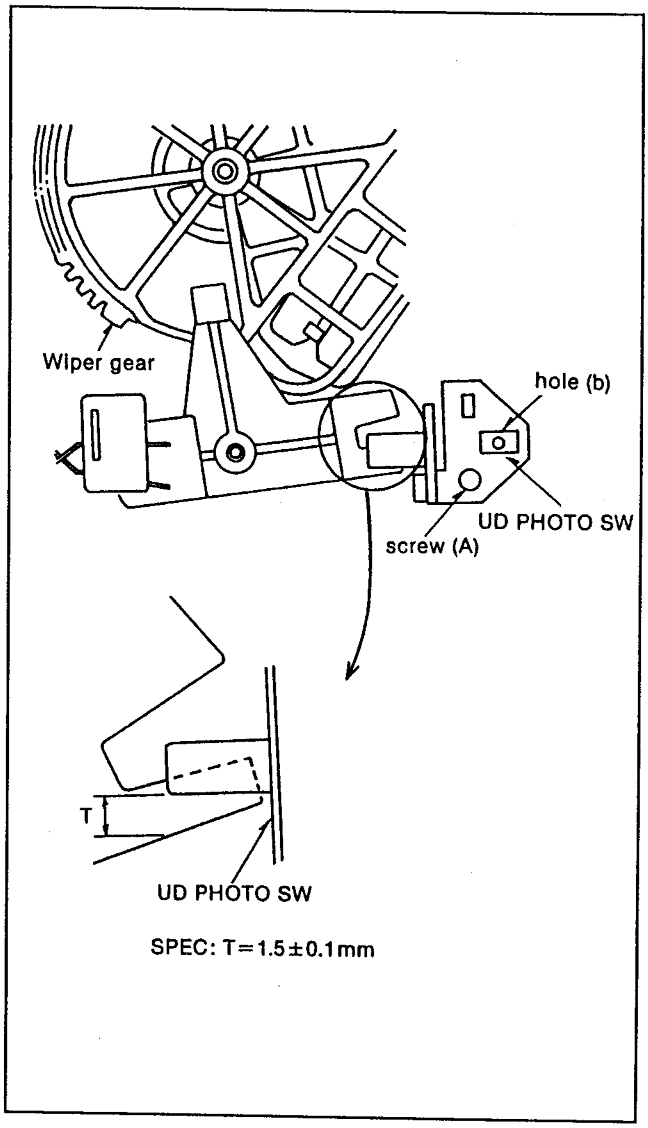

Wiper gear
hole (b)
UD PHOTO SW
screw (A)
T
UD PHOTO SW
SPEC: T=1.5±0.1mm

Fig. 6-33-2

6-34. AC HEAD CLEANER UNIT REPLACEMENT

(Removal)

1. Turn the sub loading motor to sub loading completion mode.
2. Pushing hold the ring driver gear and turn the loading ring to counterclockwise until screw (A) appear on the AC HEAD CLEANER unit as shown in Figure 6-34-1.
3. Unscrew a screw (A) and remove the AC HEAD CLEANER unit.

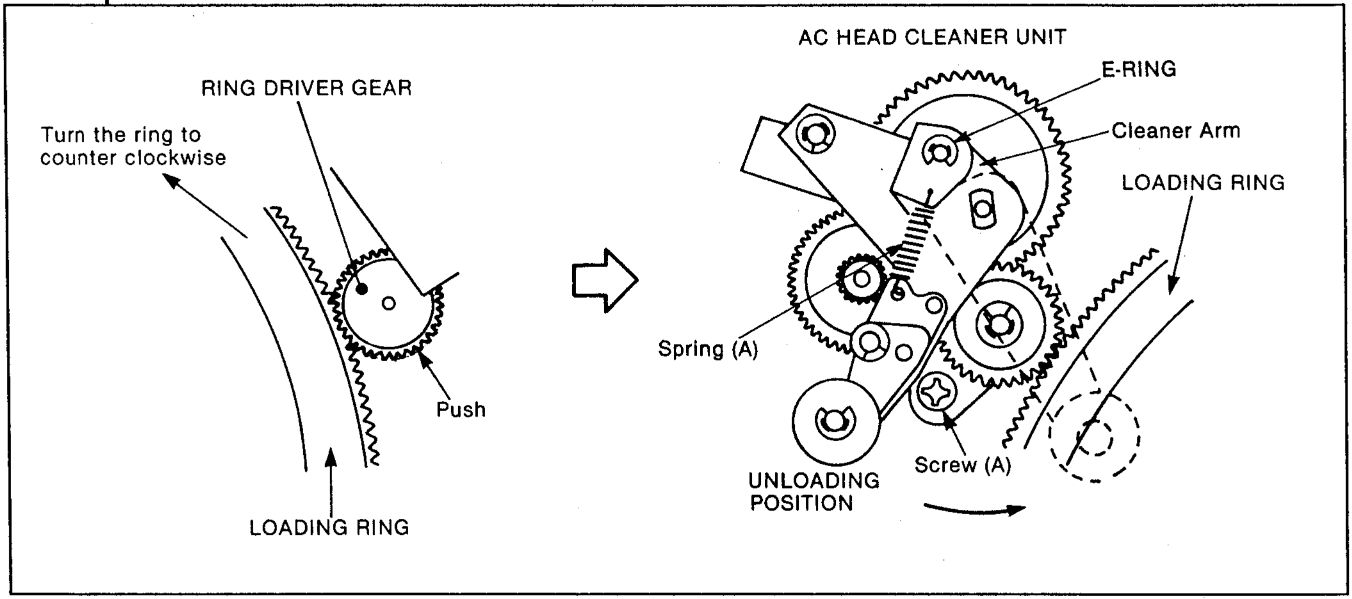

RING DRIVER GEAR
Turn the ring to counter clockwise
Push
LOADING RING
AC HEAD CLEANER UNIT
E-RING
Cleaner Arm
LOADING RING
Spring (A)
Screw (A)
UNLOADING POSITION

Fig. 6-34-1

4. Remove the loading sensor unit from the Cleaner Unit.

(Installation & Adjustment)

MACHINE CONDITION : UNLOADING MODE.

1. Insert the AC HEAD CLANER unit in the Mechanical chassis as shown in Figure 6-34-2.
2. Do not bite intermediate gear and ring gear then adjust drive cam gear so that the drive cam gear hole and CLEANER BASE hole become same position as shown in Figure 6-34-3.
3. Engage the cam gear and the ring gear then tight a screw (A) loosely.
4. Turn the loading ring so that the Machine Condition becomes item (removal) No.2 tight a screw (A) as shown Figure 6-34-1.

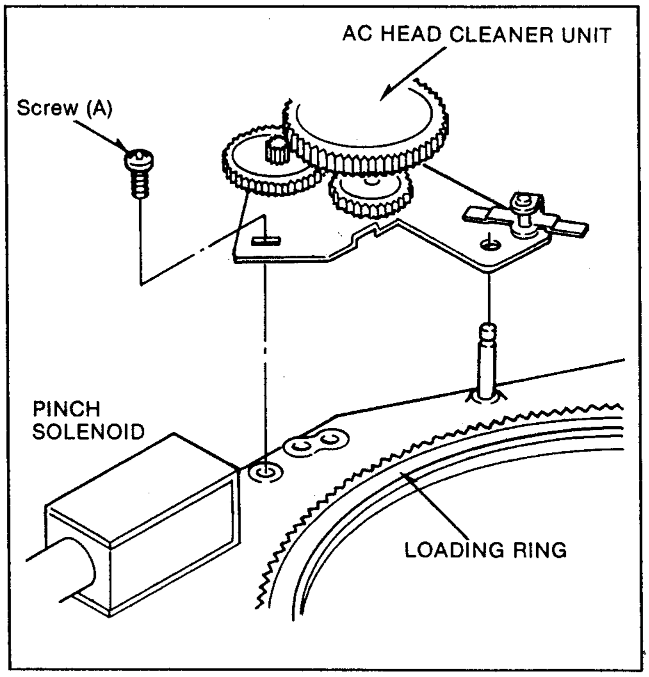

AC HEAD CLEANER UNIT
Screw (A)
PINCH SOLENOID
LOADING RING

Fig. 6-34-2

5. Install the loading sensor unit.

Note: When install it, position adjustment necessary (Refer to item 6-27).

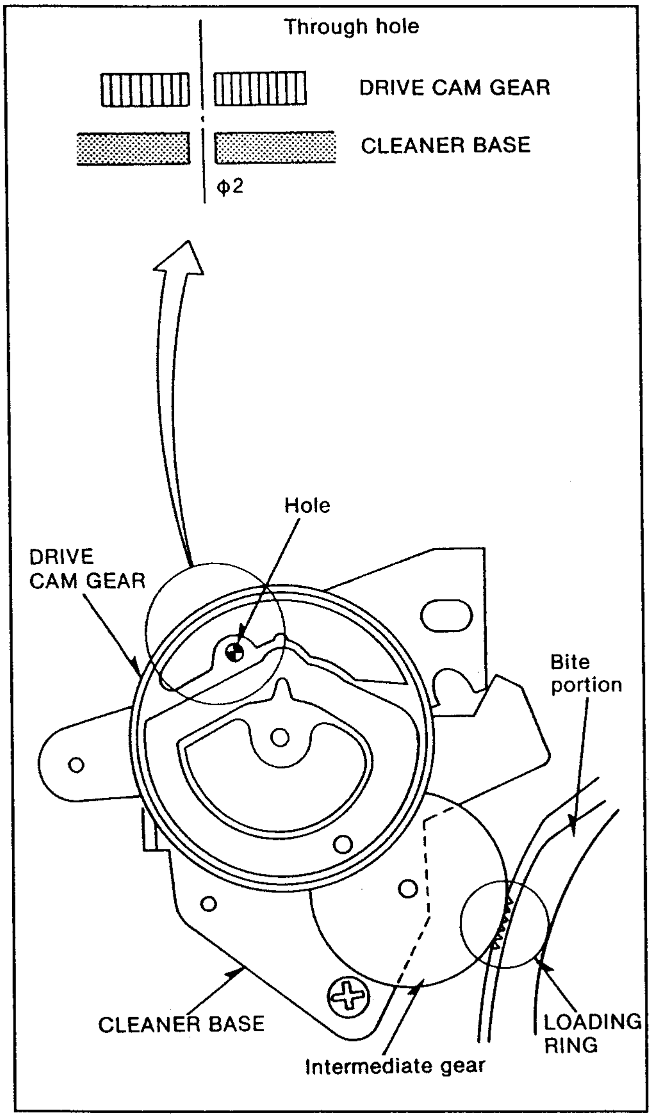

Through hole
DRIVE CAM GEAR
CLEANER BASE
ϕ2
Hole
DRIVE CAM GEAR
Bite portion
CLEANER BASE
Intermediate gear
LOADING RING

Fig. 6-34-3

6-35. AC HEAD CLEANER PAD REPLACEMENT

(Removal)

1. Remove the E-ring and pull out the cleaner arm as shown in Figure 6-35-1.
2. Remove the two cleaner caps and pull out the two cleaner pads as shown in Figure 6-35-1.

(Installation)

1. Install the cleaner pad following the previous steps in reverse order.

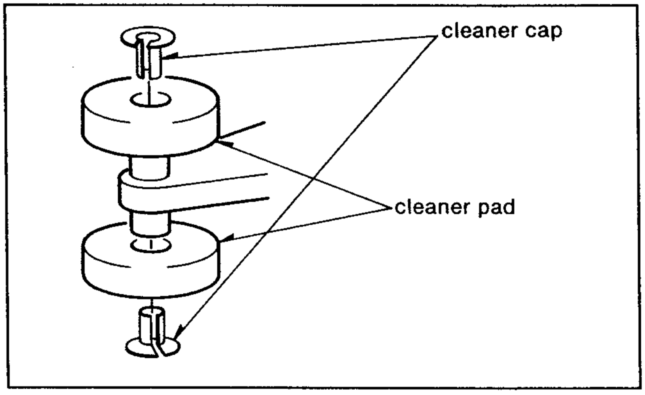

cleaner cap
cleaner pad

Fig. 6-35-1